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UNIQUE PHYSICIAN IDENTIFICATION NUMBER (UPIN) VALIDATION STUDIES

Carrier Edits

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UNIQUE PHYSICIAN IDENTIFICATION NUMBER (UPIN) VALIDATION STUDIES

PREFACE

The *Physician Registry* was established in 1989 by HCFA for the purpose of issuing unique identification numbers (UPINs) to the following Medicare providers: doctors of medicine, osteopathy, dental medicine, dental surgery, podiatry, and optometry and chiropractors. To assist in the identification of individual providers, the *Registry* collects a variety of information. HCFA contracted with Health Economics Research, Inc. (HER) to perform studies on the *Registry's* data quality and on the consistency of physician information on Medicare claims. Another objective was to develop data edits to assist carriers in maintaining their *Registry* data and to assist researchers in using *Registry* data.

The current report is the second produced under the HER contract. It provides data edits for use by carriers in maintaining their Medicare provider files. The first report describes the results of an analysis of the quality of *Registry* data. The third report provides data edits for use by researchers using *Registry* data. The fourth and final report has several components, including: (1) case studies of the operations of the *Registry* contractor and carrier operations, (2) an analysis to identify the inadvertent issuance of UPINs to group practices and corporations, (3) estimates of the number of HMO physicians without UPINs who provide services to Medicare beneficiaries, and (4) an analysis of the consistency of a physician's Medicare participation status on the *Registry* and on the physician's associated Medicare claims. An additional deliverable consists of documentation for `two` SAS files submitted to HCFA. The `two` SAS files contain special variables that indicate the quality of data elements maintained by the *Registry*, the consistency between pairs of data elements, and whether a provider might have more than one UPIN.

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CHAPTER 1

INTRODUCTION

INTRODUCTION

This document was developed to provide Medicare carriers with a set of algorithms to detect missing, erroneous, dubious, and unknown (MEDU) values of data elements within the Medicare provider files. Also provided are algorithms to detect logical inconsistencies between pairs of data elements. Finally, algorithms are provided to detect providers with more than one UPIN.

The algorithms were designed to detect data element values that do not conform to the *Physician Registry's* specifications, or meet minimum quality standards. Data elements whose combined MEDU rates exceeded 0.5 percent were chosen for inclusion. In addition, algorithms are provided for all pairs of data elements that were investigated in our *Carrier Analysis.*[1]

The audience for this document is carrier personnel responsible for maintaining the integrity of their Medicare provider file, including provider file managers, computer programmers, and data entry personnel. Data integrity specifications, flowcharts, and SAS computer programs are provided to assist programmers in implementing the detection algorithms. Data entry personnel can use the data integrity specifications as a guide to resolving data errors and inconsistencies between data elements.

The detection algorithms embodied in the flowcharts can be used at several points in the data maintenance process. They can be used: (1) post-entry before new and updated records are sent to the *Registry* and (2) for retrospective clean-up of the entire provider file. We anticipate that these two types of usage would include computerized reports generated during overnight batch jobs. The algorithms can also be used to provide interactive notification when data are entered into a new provider record or when a record is being updated; extensive modifications and, possibly, overrides would be necessary for interactive use.

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[1]Unique Physician Identification Number (UPIN) Validation Studies: Carrier Analysis, HCFA Master Contract No. 500-92-0020, Delivery Order No. 5, May 10, 1994.

In the flowcharts and SAS programs, *flag* variables are used to indicate data element integrity. The term, *flagged*, refers to data elements whose flag variable's value is not equal to *F* (feasible) nor, for some data elements, equal to *M* (missing) – see Table 2-1 for possible flag values. Data entry personnel charged with the responsibility of utilizing computerized reports to investigate the value of flagged data element(s) should be able to draw upon several sources of information to resolve problems. These sources include: (1) the provider's application form, (2) the carrier's other computerized practice settings for the provider, (3) the carrier's internal hardcopy (paper) provider files, (4) contacting the provider by phone and/or mail, and (5) state agencies (e.g., for state license number).

The detection algorithms were designed to meet HCFA's specifications for records that carriers send to the *Physician Registry* ("Carrier Record" in Exhibit 1-1). The file that we used to test the alogorithms is one that the *Registry* had provided to HCFA. Some of the data elements in the Registry file have different COBOL pictures; the date of birth's components have a different order ("Registry File" in Exhibit 1-1). As a result, our SAS programs had to account for data possibilities that might not be present in a carrier's provider file (e.g., secondary specialty code: an otherwise numeric field that might contain all blanks). Except for such circumstances, the flowcharts should be directly usable by carrier programmers. For overnight batch jobs, the STOP statements in the flowcharts indicate that no more checking of the data element is necessary and that the program can flow to the next step (e.g., check another data element). In implementing corrections during interactive data entry, the STOP statements indicate where messages can be inserted for the data entry clerk.

We have used the SAS computer language. Carriers that have SAS can use our programs with few, if any, modifications. Although some carriers may not have SAS, there are many similarities between SAS's IF/THEN/ELSE statements and those found in other programming languages such as COBOL.

EXHIBIT 1-1

FORMATS OF REGISTRY DATA ELEMENTS

	CARRIER RECORD					*REGISTRY FILE*	
Data Element	Required	COBOL Picture	Justification	Component Order	Missing Value	COBOL Picture	Component Order
Date of birth	Y	9(06)	R	MMDDYY	0	S9(09) COMP-3	YYMMDD
School code	Y	X(05)	R		blank	X(05)	
Year graduated	Y	9(02)	R	YY	0	S9(09) COMP-3	YY
Sanction code	N	X(01)			blank	X(01)	
Sanction, effective date	N	9(04)	R	MMYY	0	9(04)	MMYY
Sanction, number of years	N	9(02)	R		0	S9(03) COMP-3	
State license number	Y	X(12)	R		blank	X(12)	
Physician status	Y	9			0	X(01)	
Provider credentials	Y	X(03)	L		blank	X(03)	
Primary specialty	Y	9(02)	R		0	X(02)	
Secondary specialty	N	9(02)	R		0	X(02)	

Sources:

1. Carrier record formats from HCFA Transmittals.
2. Registry file formats from Transamerica Occidental Life Insurance Company: version of file sent to HCFA.

When reading a flat (raw) file, if SAS encounters a blank field (regardless of whether the field is numeric or alphanumeric), SAS automatically assigns a *missing value* code to the data element. For numeric fields the missing value code is equal to a period while for alphanumeric fields the missing value code is a blank. If a data element was filled with all 9s instead of zeroes or blanks, it was also considered to be a missing value. In the provided SAS print-outs, a "^" denotes a logical NOT operation, a "|" denotes a logical OR operation and a "||" denotes a concatenation operation.

We have attempted to adhere to standard flowcharting rules. From decision "diamonds," all "*Yes*" branches flow downward and all "*No*" branches flow to the right. However, because of the availability of more recent programming tools and changes in programming philosophy, flowcharts don't always move downward. With regard to IF statements, in particular, conditions that most of the observations satisfy are usually placed at the beginning of a series of IF/THEN/ELSE statements according to current programming philosophy.

In contrast with traditional, structured computer languages such as COBOL and FORTRAN, SAS is not a structured language. Although there are many similarities between SAS and computer languages such as COBOL, SAS statements can be quite different from statements in other computer languages (e.g., data subsetting statements) and allow operations (e.g., merging two files) that would have required substantially more program code in other computer languages (especially COBOL prior to 1980). Thus, the provided SAS code obtains the objective specified in the flowcharts, but not necessarily in the same order. For an example, see the flowchart and SAS code for the integrity of school codes.

The next chapter of this document provides the detection algorithms for data element integrity. The third chapter provides the algorithms for detecting inconsistencies between pairs of data elements. For each single data element or pairs of data elements, we provide (1) a brief description of the types of errors or inconsistencies found in the July 1993 *Physician Registry* file,

(2) data integrity specifications, (3) flowcharts for detecting anomalous values, and (4) the SAS computer program used to detect or flag anomalous conditions. Chapter four provides algorithms for detecting providers that have more than one UPIN.

CHAPTER 2

DATA ELEMENT INTEGRITY

The specifications provided in this chapter were designed to conform to the Carrier Record specifications for the provider records sent by carriers to the *Physician Registry*. We developed computer algorithms that determine conformance with our specifications. The algorithms create flag variables that denote the validity or feasibility of a data element value. Table 2-1 shows the values of the flag variables, their definition, and their frequencies as of July 1993. Data integrity specifications for each data element in Table 2-1 are provided in this chapter. Additionally, specifications for provider credentials and physician status are included as input for specifications provided in Chapter 3. Because provider credentials and physician status only had three non-feasible values between them, they are not included in Table 2-1.

TABLE 2-1

DISTRIBUTION OF DATA ELEMENT VALUES

Flag	Definition	Date of Birth	State License Number	SANCTION Code	SANCTION Date	SANCTION Length	SPECIALTY CODE Primary	SPECIALTY CODE Secondary	School Code	Graduation Year
F	Feasible	1,609,540	1,151,415	3,188	2,526	2,534	1,993,786	114,034	1,623,658	1,543,272
M	Missing	304,517	270,375	1,994,698	1,996,343	1,996,436		1,884,816	361,521	441,216
E	Erroneous	69,605			199		1	1	11,665	4,364
D	Dubious	12,313				98				10,216
1	January 1, 1901	3,093								
J	Not properly justified		518,203							
R	Retired code						2,468	117	2,224	
0	Zero-filled state license number		59,075							
S	Miscellaneous specialty code (49)						2,184	53		
U	Unknown			1,182			629	47		
	Total:	1,999,068	1,999,068	1,999,068	1,999,068	1,999,068	1,999,068	1,999,068	1,999,068	1,999,068

Source: Registry File, July 1993.

DATA ELEMENT: DATE OF BIRTH

Date of birth is a required data element. Month and day values are sometimes out of range (e.g., month = 15). Year sometimes has implausible values (e.g., 82). Sometimes the value does not correspond to the carrier record format or to the Registry file format (see Exhibit 1-1) as when a date of birth has 5000 as its value instead of its actual value.

Data Format:

Carrier Record: PIC 9(06); Component Order: MMDDYY
Registry File: PIC S9(09) COMP-3; Component Order: YYMMDD

Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
J	Not properly justified	not right justified
F	Feasible	14≤year≤69 and 1≤month≤12 and day value consistent with month and year
D	Dubious	((year=99) or (0≤year≤13)) and (1≤month≤12) and day value consistent with month and year
1	January 1, 1901	date of birth = 10101
M	Missing	date of birth = 0, blank, or 999999
E	Erroneous	all other values

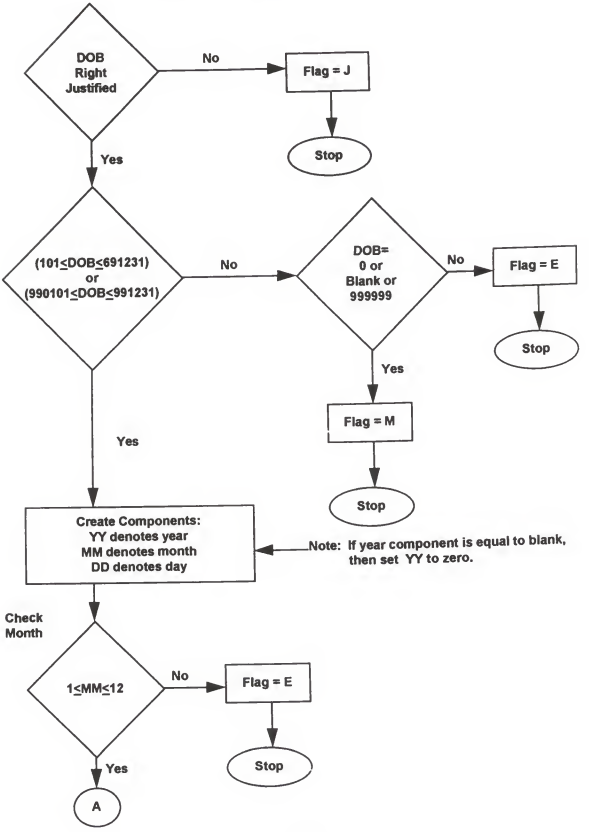
Notes:

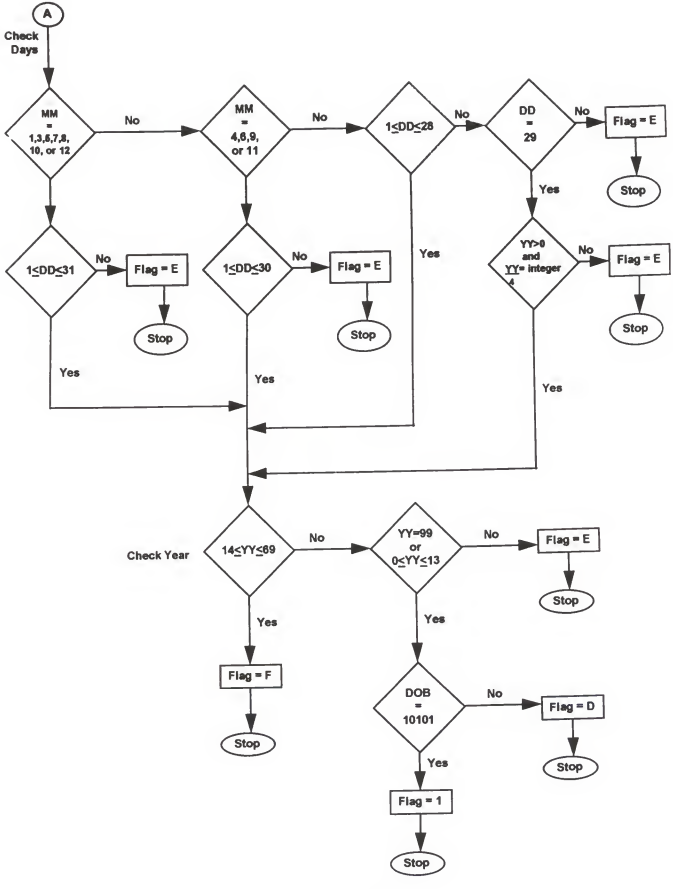
(1) Note that the order of the components of date of birth on the Registry file differs from the carrier record (Exhibit 1-1).

(2) Providers are not allowed to be age 23 or younger. Thus, for the July 1993 Registry file, the upper bound for feasible values of year was 69. The upper bound needs to be annually adjusted upward, 70 for 1994, 71 for 1995, and so on. Note that there might be infrequent cases in which the provider actually is 23 years old or less - such instances should be verified.

(3) In one of our investigations, we noticed that the frequency of January 1, 1901 dates of birth is implausibly high. Additionally, all dates of birth prior to 1914 imply an age greater than 79 in 1993; in most instances the provider is retired. All dates of birth prior to 1914 should be reviewed. The upper bound for the dubious category needs to be annually adjusted upward.

FLOWCHART FOR DATE OF BIRTH (DOB) INTEGRITY




A
Check Days
MM = 1,3,5,7,8, 10, or 12
No
MM = 4,6,9, or 11
No
1≤DD≤28
No
DD = 29
No
Flag = E
Stop
Yes
YY>0 and YY= integer 4
No
Flag = E
Stop
Yes
1≤DD≤31
No
Flag = E
Stop
Yes
1≤DD≤30
No
Flag = E
Stop
Yes
Yes
Yes
Check Year
14≤YY≤69
No
YY=99 or 0≤YY≤13
No
Flag = E
Stop
Yes
Yes
Flag = F
Stop
DOB = 10101
No
Flag = D
Stop
Yes
Flag = 1
Stop

```
 /*********************************************************/
 /*                                                       */
 /* -Date of birth integrity check                        */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=SETDOB);

 /* SETTING DATE OF BIRTH (SETDOB) */

 IF SETDOB>0 THEN DO;
  DOBYRS = SUBSTR(SETDOB,7,2);
  MODAYS = SUBSTR(SETDOB,9,4);
  IF DOBYRS='  ' THEN DO;
   IF (101<=SETDOB<=131) ] (201<=SETDOB<=229) ]
      (301<=SETDOB<=331) ] (401<=SETDOB<=430) ]
      (501<=SETDOB<=531) ] (601<=SETDOB<=630) ]
      (701<=SETDOB<=731) ] (801<=SETDOB<=831) ]
      (901<=SETDOB<=930) ] (1001<=SETDOB<=1031) ]
      (1101<=SETDOB<=1130) ] (1201<=SETDOB<=1231)
      THEN DOBYRS='00';
   END;
 END;

 IF ('14'<=DOBYRS<='69') & MODAYS^='0000' & SETDOB^=10101 &
 ((' 101'<=MODAYS<='0131') ] (' 201'<=MODAYS<='0228') ]
  (MODAYS='0229' & DOBYRS^='00' &  (DOBYRS/4=INT(DOBYRS/4))) ]
  (' 301'<=MODAYS<='0331') ] (' 401'<=MODAYS<='0430') ]
  (' 501'<=MODAYS<='0531') ] (' 601'<=MODAYS<='0630') ]
  (' 701'<=MODAYS<='0731') ] (' 801'<=MODAYS<='0831') ]
  (' 901'<=MODAYS<='0930') ] ('1001'<=MODAYS<='1031') ]
  ('1101'<=MODAYS<='1130') ] ('1201'<=MODAYS<='1231')) THEN HDOBS='F';

 /* FIRST CLAUSE BELOW INCLUDES '00' */

 ELSE IF (' 1'<=DOBYRS<='13') & MODAYS^='0000' & SETDOB^=10101 &
 ((' 101'<=MODAYS<='0131') ] (' 201'<=MODAYS<='0228') ]
  (MODAYS='0229' & DOBYRS^='00' &  (DOBYRS/4=INT(DOBYRS/4))) ]
  (' 301'<=MODAYS<='0331') ] (' 401'<=MODAYS<='0430') ]
  (' 501'<=MODAYS<='0531') ] (' 601'<=MODAYS<='0630') ]
  (' 701'<=MODAYS<='0731') ] (' 801'<=MODAYS<='0831') ]
  (' 901'<=MODAYS<='0930') ] ('1001'<=MODAYS<='1031') ]
  ('1101'<=MODAYS<='1130') ] ('1201'<=MODAYS<='1231')) THEN HDOBS='D';

 ELSE IF SETDOB=999999 ] SETDOB=0 ] SETDOB=. THEN HDOBS='M';

 ELSE IF SETDOB=10101 THEN HDOBS='1';

 ELSE IF DOBYRS='99' & MODAYS^='0000' &
 ((' 101'<=MODAYS<='0131') ] (' 201'<=MODAYS<='0228') ]
  (MODAYS='0229' & DOBYRS^='00' &  (DOBYRS/4=INT(DOBYRS/4))) ]
  (' 301'<=MODAYS<='0331') ] (' 401'<=MODAYS<='0430') ]
  (' 501'<=MODAYS<='0531') ] (' 601'<=MODAYS<='0630') ]
  (' 701'<=MODAYS<='0731') ] (' 801'<=MODAYS<='0831') ]
```

```
  (' 701'<=MODAYS<='0731') ] (' 801'<=MODAYS<='0831') ]
  (' 901'<=MODAYS<='0930') ] ('1001'<=MODAYS<='1031') ]
  ('1101'<=MODAYS<='1130') ] ('1201'<=MODAYS<='1231')) THEN HDOBS='D';

 ELSE HDOBS='E';

OUTPUT S;

RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES HDOBS;
 TITLE '**** SETTING DATE OF BIRTH ****';
RUN;
```

DATA ELEMENT: STATE LICENSE NUMBER

State license number is a required data element. It should be right-justified and preceded (padded) with zeroes. Left justification and filling with zeroes instead of blanks are the two most frequent types of non-conformance with Registry specifications.

Data Format:

PIC X(12) for both Carrier Record and Registry File.

Flag assignment hierarchy, in descending order of priority:

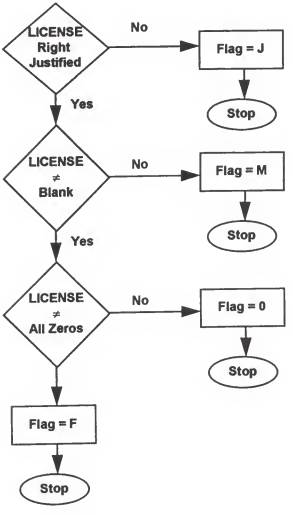
Flag	Definition	Criteria
J	Not properly justified	not right justified
0	Zero-filled	zeroes in all byte positions
M	Missing	blanks in all byte positions
F	Feasible	all other values

Notes:

(1) Feasible in this instance means that the data element conforms to Registry specification; however, it does not mean that the actual value is correct, or for that matter, conforms to the issuing state's license number format.

(2) Although required now, state license number was not required for the initial Registry load.

FLOWCHART FOR
STATE LICENSE NUMBER (LICENSE) INTEGRITY



```
 /*****************************************************/
 /*                                                   */
 /* -Check integrity of State License Number          */
 /*                                                   */
 /*****************************************************/

DATA A;
 SET IN.JUL0293
   (KEEP=LICENSE);

 /* LICENSE */

IF LICENSE^=RIGHT(LICENSE) THEN HLICENSE='J';

ELSE IF LICENSE='           ' THEN HLICENSE='M';

ELSE IF LICENSE='000000000000' THEN HLICENSE='0';


ELSE HLICENSE='F';
RUN;

PROC FREQ ORDER=FREQ;
 TABLES HLICENSE;
 TITLE '*** SETTING - LICENSE ***';
 RUN;
```

DATA ELEMENT: SCHOOL CODE

School code is a required data element. Values equal to all blanks frequently occur. Completely erroneous codes occur less frequently. Since the establishment of the Registry, some codes have been superceded (retired).

Data Format:

PIC X (05) for both carrier record and Registry File.

Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
J	Not properly justified	not right justified
F	Feasible	codes present in Exhibit 2-1
R	Retired code	'000XA'≤school code≤'000XE' or school code = '000XJ' or '000XK'
M	Missing	school code = blanks, '00000', or '00001'
E	Erroneous	all other values

Notes:

(1) School codes were not required for the initial Registry load.

(2) Near the beginning of the implementation phase of the Registry, carriers were instructed to use the following codes for limited license practitioners (*Program Memorandum*, Carrier Transmittal No. B-89-2, February 1989):

Code	Credential
10000	Doctor of Dental Medicine (DDM)
20000	Doctor of Dental Surgery (DDS)
30000	Podiatry (DPM)
40000	Optometry (OD)
50000	Chiropractic (CH)

(a) In October 1989, individual school codes were listed in Exhibits 3B-3D of the *Medicare Carriers Manual*, Part 4, Professional Relations, Transmittal No. 2 (October 1989).

(b) Additionally, in Transmittal No. 2 (Exhibit 3C), code 40000 was assigned to the School of Optometry at the University of Alabama in Birmingham.

(3) Podiatric school codes were revised in 1991 (Exhibit 3B, *Medicare Carriers Manual*, Part 4, Professional Relations, Transmittal No. 6, December 1991):

Old	New	Name
000XA	30000	California College of Podiatric Medicine
000XB	30100	Dr. William M. Scholl College of Podiatric Medicine
000XC	30200	New York College of Podiatric Medicine
000XD	30300	Ohio College of Podiatric Medicine
000XE	30400	Pennsylvania College of Podiatric Medicine
000XK	30500	Barry University School of Podiatric Medicine
000XJ	30600	College of Podiatric Medicine and Surgery, University of Osteopathic Medicine and Health Sciences

(a) Codes 000XF-000XI have not been superseded and are assigned to podiatric schools that are now closed.
(b) Prior to the above revisions, school code 30000 was used to indicate any podiatry school.

(4) Even though individual codes have been assigned to podiatry, optometry, and chiropactic schools, codes 30000, 40000, and 50000 are excessively used (use of each *catch-all* code constitutes well over half of its respective category's code usage). Therefore, we suggest that the school code be reviewed for each provider that has one of these three codes assigned. (Since neither the accompanying flowchart nor the SAS program provide for such identification, modifications to them would be necessary to identify such providers.)

EXHIBIT 2-1

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
00102	University of Alabama School of Medicine	Birmingham, AL
00104	Birmingham Medical College	Birmingham, AL
00106	University of South Alabama College of Medicine	Mobile, AL
00301	University of Arizona College of Medicine	Tuscon, AR
00401	University of Arkansas College of Medicine	Little Rock, AR
00402	College of Physicians and Surgeons	Little Rock, AR
00501	Cooper Medical College	San Francisco, CA
00502	University of California, San Francisco, School of Medicine	San Francisco, CA
00504	California Eclectic Medical College	Los Angeles, CA
00505	Hahneman Medical College of the Pacific (Homeopathic)	San Francisco, CA
00506	University of Southern California School of Medicine	Los Angeles, CA
00507	College of Physicians and Surgeons of San Francisco	San Francisco, CA
00508	Oakland College of Medicine and Surgery	Oakland, CA
00509	College of Physicians and Surgeons of Los Angeles	Los Angeles, CA
00511	Stanford University School of Medicine	Palo Alto, CA
00512	Loma Linda University School of Medicine	Loma Linda, CA
00513	Pacific Medical College	Los Angeles, CA
00514	University of California, Los Angeles, School of Medicine	Los Angeles, CA
00515	University of California, Irvine, California College of Medicine	Irvine, CA
00516	University California Ca College of Med Irvine CA	Irvine, CA
00517	University Of Cal College of Medicine Irvine CA	Irvine, CA
00518	University of California, San Diego, School of Medicine	La Jolla, CA
00519	University of California, Davis, School of Medicine	Davis, CA
00576	College of Osteopathic Medicine of the Pacific	Pomona, CA
00702	University of Colorado School of Medicine	Denver, CO
00705	Denver and Gross College of Medicine	Denver, CO
00801	Yale University School of Medicine	New Haven, CT
00802	University of Connecticut School of Medicine	Farmington, CT
01001	George Washington University School of Medicine and Health Sciences	Washington, D.C.
01002	Georgetown University School of Medicine	Washington, D.C.
01003	Howard University College of Medicine	Washington, D.C.
01102	University of Miami School of Medicine	Miami, FL
01103	University of Florida College of Medicine	Gainesville, FL
01104	University of South Florida College of Medicine	Tampa, FL
01175	Southeastern University of Health Sciences College of Osteopathic Medicine	Miami, FL
01201	Medical College of Georgia	Augusta, GA
01205	Emory University School of Medicine	Augusta, GA
01209	Georgia College of Eclectic Medicine and Surgery	Augusta, GA
01211	Atlanta College of Physicians and Surgeons	Atlanta, GA

EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
01212	Atlanta School of Medicine	Atlanta, GA
01218	Hospital Medical College Eclectic	Atlanta, GA
01219	Southern College of Medicine & Surgery	Atlanta, GA
01221	Morehouse School of Medicine	Atlanta, GA
01222	Mercer University School of Medicine	Macon, GA
01401	University of Hawaii John A. Burns School of Medicine	Honolulu, HI
01601	Rush Medical College	Chicago, IL
01602	University of Chicago Pritzker School of Medicine	Chicago, IL
01604	Hahneman Medical College and Hospital	Chicago, IL
01605	College Of Medicine and Surgery (Physio-Medical)	Chicago, IL
01606	Northwestern University Medical School	Chicago, IL
01608	Bennett Medical College	Chicago, IL
01609	Northwestern University Womans Medical School	Chicago, IL
01610	The Chicago Homeopathic Medical College	Chicago, IL
01611	University of Illinois College of Medicine	Chicago, IL
01613	Harvey Medical College	Chicago, IL
01614	National Medical University	Chicago, IL
01615	Hering Medical College (Homeopathic)	Chicago, IL
01616	Jenner Medical College	Chicago, IL
01617	Illinois Medical College	Chicago, IL
01618	Dunham Medical College	Chicago, IL
01619	American Medical Missionary College	Battle Creek, MI & Chicago, IL
01622	Chicago College of Medicine and Surgery	Chicago, IL
01623	Dearborn Medical College	Chicago, IL
01642	University of Health Sciences/The Chicago Medical School	North Chicago, IL
01643	Loyola University of Chicago, Stritch School of Medicine	Maywood, IL
01644	The General Medical College	Chicago, IL
01645	Southern Illinois University School of Medicine	Springfield, IL
01675	Chicago College of Osteopathic Medicine	Chicago, IL
01705	Physio-Medical College of Indiana	Indianapolis, IN
01708	The Medical College of Indiana	Indianapolis, IN
01709	Central College of Physicians & Surgeons	Indianapolis, IN
01717	Eclectic Medical College of Indiana	Indianapolis, IN
01718	Indiana Medical College, School of Medicine of Purdue University	Indianapolis, IN
01720	Indiana University School of Medicine	Indianapolis, IN
01801	College of Physicians and Surgeons	Keokuk, IA
01803	University of Iowa College of Medicine	Iowa City, IA
01804	State University of Iowa, College of Homeopathic Medicine	Iowa City, IA
01806	Drake University College of Medicine	Des Moines, IA

EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
01808	Sioux City College of Medicine	Sioux City, IA
01810	Keokuk Medical College, College of Physicians and Surgeons	Keokuk, IA
01875	University of Osteopathic Medicine and Health Sciences/College of Osteopathic Medicine and Surg	Des Moines, IA
01902	University of Kansas School of Medicine	Kansas City, KS
01903	Kansas Medical College (Medical Department of Washburn College)	Topeka, KS
01904	College of Physicians and Surgeons of Kansas City	Kansas City, KS
01907	Western Eclectic College of Medicine and Surgery	Kansas City, KS
02001	Kentucky School of Medicine	Louisville, KY
02002	University Of Louisville School of Medicine	Louisville, KY
02004	Louisville Medical College	Louisville, KY
02005	Hospital College of Medicine (Med Dept of Central University)	Louisville, KY
02007	Louisville National Medical College (Med Dept State University)(Black)	Louisville, KY
02008	Southwestern Homeopathic Medical College and Hospital	Louisville, KY
02009	Kentucky University Medical Department	Louisville, KY
02011	Louisville and Hospital Medical College	Louisville, KY
02012	University of Kentucky College of Medicine	Lexington, KY
02101	Tulane University School of Medicine	New Orleans, LA
02104	Flint Medical College of New Orleans University (Black)	New Orleans, LA
02105	Louisiana State University School of Medicine in New Orleans	New Orleans, LA
02106	Louisiana State University School of Medicine in Shreveport	Shreveport, LA
02201	Bowdoin Medical School	Brunswick and Portland, ME
02275	University of New England College of Osteopathic Medicine	Biddeford, ME
02301	University of Maryland School of Medicine	Baltimore, MD
02303	College of Physicians and Surgeons of Baltimore	Baltimore, MD
02304	Baltimore Medical College	Baltimore, MD
02305	Woman's Medical College of Baltimore	Baltimore, MD
02306	Baltimore University School of Medicine	Baltimore, MD
02307	John Hopkins University School of Medicine	Baltimore, MD
02308	Atlantic Medical College	Baltimore, MD
02309	Maryland Medical College	Baltimore, MD
02311	Maryland College of Eclectic Medicine and Surgery	Baltimore, MD
02312	Uniformed Services University of Health Science	Bethesda, MD
02401	Harvard Medical School	Boston, MA
02405	Boston University School of Medicine	Boston, MA
02406	College of Physicians and Surgeons	Boston, MA
02407	Tufts University School of Medicine	Boston, MA
02415	Middlesex University School of Medicine	Waltham, MA
02416	University of Massachusetts Medical School	Worcester, MA
02501	University of Michigan Medical School	Ann Arbor, MI

EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
02505	University of Michigan Homeopathic Medical School	Ann Arbor, MI
02507	Wayne State University School of Medicine	Detroit, MI
02508	Michigan College of Medicine & Surgery	Detroit, MI
02512	Michigan State University College of Human Medicine	East Lansing, MI
02576	Michigan State University College of Osteopathic Medicine	East Lansing, MI
02604	University of Minnesota Medical School	Minneapolis, MN
02605	Minneapolis College of Physicians and Surgeons	Minneapolis, MN
02607	University of Minnesota Duluth School of Medicine	Duluth, MN
02608	Mayo Medical School	Rochester, MN
02701	University Mississippi School of Medicine	Jackson, MI
02702	Mississippi Medical College	Meridian, MI
02801	Missouri Medical College	St. Louis, MO
02802	Washington University Medical School	St. Louis, MO
02803	University of Missouri Columbia School of Medicine	Columbia, MO
02805	Homeopathic Medical College of Missouri	St. Louis, MO
02807	St. Louis College of Physicians and Surgeons	St. Louis, MO
02808	Kansas City Medical College	Kansas City, MO
02810	National University of the Arts and Sciences Medical Department	St. Louis, MO
02820	University Medical College of Kansas City	Kansas City, MO
02822	Ensworth Medical College	St. Joseph, MO
02826	Kansas City Homeopathic Medical College	Kansas City, MO
02828	Barnes Medical College	St. Louis, MO
02830	Woman's Medical College	Kansas City, MO
02833	Eclectic Medical University	Kansas City, MO
02834	Saint Louis University School of Medicine	St. Louis, MO
02835	Southwest School of Medicine and Hospital	Kansas City, MO
02843	Kansas City College of Medicine and Surgery	Kansas City, MO
02844	Kansas City University of Physicians and Surgeons	Kansas City, MO
02845	Mid West Medical College	Kansas City, MO
02846	University of Missouri Kansas City School of Medicine	Kansas City, MO
02878	The University of Health Sciences College of Osteopathic Medicine	Kansas City, MO
02879	Kirksville College of Osteopathic Medicine	Kirksville, MO
03004	Lincoln Medical College, Eclectic	Lincoln, NE
03005	University of Nebraska College of Medicine	Omaha, NE
03006	Creighton University School of Medicine	Omaha, NE
03007	Nebraska College of Medicine	Lincoln, NE
03101	University of Nevada School of Medicine	Reno, NV
03201	Dartmouth Medical School	Hanover, NH
03305	University of Medicine and Dentistry of New Jersey-New Jersey Medical School	Newark, NJ

EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
03306	University of Medicine and Dentistry of New Jersey- Robert Wood Johnson Medical School	Piscataway, NJ
03375	University of Medicine and Dentistry of New Jersey-New Jersey School of Osteopathic Medicine	Camden, NJ
03401	University of New Mexico School of Medicine	Albuquerque, NM
03501	Columbia University College of Physicians and Surgeons	New York, NY
03503	Albany Medical College of Union University	Albany, NY
03506	State University of New York at Buffalo School of Medicine	Buffalo, NY
03508	State University of New York Health Science Center at Brooklyn	Brooklyn, NY
03509	New York Medical College	Valhalla, NY
03510	Bellevue Hospital Medical College	New York, NY
03511	New York Medical College and Hospital for Women, Homeopathic	New York, NY
03513	Eclectic Medical College of the City of New York	New York, NY
03515	State University of New York Health Science Center	Syracuse, NY
03519	New York University School of Medicine	New York, NY
03520	Cornell University Medical College	New York, NY
03543	Fordham University School of Medicine	New York, NY
03545	University of Rochester School of Medicine and Dentistry	Rochester, NY
03546	Albert Einstein College of Medicine of Yeshiva University	New York, NY
03547	Mount Sinai School of Medicine of the City University of New York	New York, NY
03548	State University of New York at Stony Brook School of Medicine	Stony Brook, NY
03575	New York College of Osteopathic Medicine of New York Institute of Technology	Old Westbury, NY
03601	University of North Carolina at Chapel Hill School of Medicine	Chapel Hill, NC
03603	Leonard Medical School (Black)	Raleigh, NC
03604	North Carolina Medical College	Charlotte, NC
03605	Bowman Gray School of Medicine of Wake Forest University	Winston-Salem, NC
03607	Duke University School of Medicine	Durham, NC
03608	East Carolina University School of Medicine	Greenville, NC
03701	University of North Dakota School of Medicine	Grand Forks, ND
03801	Medical College of Ohio	Cincinnati, OH
03802	Eclectic Medical College	Cincinnati, OH
03803	Starling Medical College	Columbus, OH
03806	Case Western Reserve University School of Medicine	Cleveland, OH
03808	Cincinnati College of Medicine and Surgery	Cincinnati, OH
03809	Miami Medical College	Cincinnati, OH
03811	University of Wooster Medical Department	Cleveland, OH
03819	Toledo Medical College (Med Dept of Toledo University)	Toledo, OH
03823	Cleveland Medical College, Homeopathic	Cleveland, OH
03825	Ohio Medical University	Columbus, OH
03826	Cleveland-Pulte Medical College	Cleveland, OH
03840	Ohio State University College of Medicine	Columbus, OH

EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
03841	University of Cincinnati College of Medicine	Cincinnati, OH
03843	Medical College of Ohio at Toledo	Toledo, OH
03844	Northeastern Ohio Universities College of Medicine	Rootstown, OH
03845	Wright State University School of Medicine	Dayton, OH
03875	Ohio University College of Osteopathic Medicine	Athens, OH
03901	University of Oklahoma College of Medicine	Oklahoma City, OK
03905	Oral Roberts University School of Medicine	Tulsa, OK
03979	Oklahoma State University College of Osteopathic Medicine	Tulsa, OK
04001	Willamette University Medical Department	Salem, OR
04002	Oregon Health Sciences University School of Medicine	Portland, OR
04101	University of Pennsylvania School of Medicine	Philadelphia, PA
04102	Jefferson Medical College of Thomas Jefferson University	Philadelphia, PA
04107	Medical College of Pennsylvania	Philadelphia, PA
04109	Hahnemann University School of Medicine	Philadelphia, PA
04111	Medico-Chirurgical College of Philadelphia	Philadelphia, PA
04112	University of Pittsburgh School of Medicine	Pittsburgh, PA
04113	Temple University School of Medicine	Philadelphia, PA
04114	Pennsylvania State University College of Medicine	Hershey, PA
04177	Philadelphia College of Osteopathic Medicine	Philadelphia, PA
04201	University of Puerto Rico School of Medicine	San Juan, Puerto Rico
04202	Ponce School of Medicine	Ponce, Puerto Rico
04203	University Central del Caribe Escuela de Medicina	Cayey, Puerto Rico
04204	Ciencias Medicina de San Juan Bautista	Hato Rey, Puerto Rico
04301	Brown University Program in Medicine	Providence, RI
04501	Medical University of South Carolina College of Medicine	Charleston, SC
04504	University of South Carolina School of Medicine	Columbia, SC
04601	University of South Dakota School of Medicine	Vermillion, SD
04701	University of Nashville Medical Department	Nashville, TN
04705	Vanderbilt University School of Medicine	Nashville, TN
04706	University of Tennessee College of Medicine	Memphis, TN
04707	Meharry Medical College School of Medicine	Nashville, TN
04708	Memphis Hospital Medical College	Memphis, TN
04709	Chattanooga Medical College	Chattanooga, TN
04710	Lincoln Memorial University Medical Department	Knoxville, TN
04711	University of the South Medical Department	Sewanee, TN
04713	Knoxville Medical College (Black)	Knoxville, TN
04714	University of West Tennesee College of Medicine and Surgery (Black)	Memphis, TN
04715	College of Physicians and Surgeons	Memphis, TN
04720	East Tennessee State University James H. Dishner College of Medicine	Johnson City, TN

EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
04802	University of Texas Medical Branch at Galveston	Galveston, TX
04803	Fort Worth School Of Medicine	Fort Worth, TX
04804	Baylor University College Of Medicine	Houston, TX
04805	Physio-Medical College of Texas	Dallas, TX
04806	Southern Methodist University Medical Department	Dallas, TX
04807	Gate City Medical College	Dallas, TX
04812	University of Texas Southwestern Medical Center at Dallas School of Medicine	Dallas, TX
04813	University of Texas Medical School at San Antonio	San Antonio, TX
04814	University of Texas Medical School at Houston	Houston, TX
04815	Texas Tech University Health Sciences Center School of Medicine	Lubbock, TX
04816	Texas A&M University College of Medicine	College Station, TX
04878	Texas College of Osteopathic Medicine	Fort Worth, TX
04901	University of Utah School of Medicine	Salt Lake City, UT
05002	University of Vermont College of Medicine	Burlington, VT
05101	University of Virginia School of Medicine	Charlottesville, VA
05104	Virginia Commonwealth University Medical College of Virginia	Richmond, VA
05106	University College of Medicine	Richmond, VA
05107	Eastern Virginia Medical School	Norfolk, VA
05404	University of Washington School of Medicine	Seattle, WA
05415	Washington College of Physicians and Surgeons	Seattle, WA
05501	West Virginia University School of Medicine	Morgantown, WV
05502	Marshall University School of Medicine	Huntington, WV
05575	West Virginia School of Osteopathic Medicine	Lewisburg, WV
05602	Wisconsin College of Physicians and Surgeons	Milwaukee, WI
05603	Milwaukee Medical College	Milwaukee, WI
05605	University of Wisconsin Medical School	Madison, WI
05606	Medical College of Wisconsin	Milwaukee, WI
000Xa	California College of Podiatric Medicine	San Francisco, CA
000Xb	Dr. William M. Scholl College of Podiatric Medicine	Chicago, IL
000Xc	New York College of Podiatric Medicine	New York, NY
000Xd	Ohio College of Podiatric Medicine	Cleveland, OH
000Xe	Pennsylvania College of Podiatric Medicine	Philadelphia, PA
000Xk	Barry University School of Podiatric Medicine	Miami Shores, FL
000Xj	College of Podiatric Medicine And Surgery	Des Moines, IA
000Xf	Temple University	Philadelphia, PA
000Xg	Chicago College of Chiropody	Chicago, IL
000Xh	Long Island University College of Podiatry	New York, NY
000Xi	First Institute Podiatry	New York, NY
30000	California College of Podiatric Medicine	San Francisco, CA

EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
30100	Dr. William M. Scholl College of Podiatric Medicine	Chicago, IL
30200	New York College of Podiatric Medicine	New York, NY
30300	Ohio College of Podiatric Medicine	Cleveland, OH
30400	Pennsylvania College of Podiatric Medicine	Philadelphia, PA
30500	Barry University School of Podiatric Medicine	Miami Shores, FL
30600	College of Podiatric Medicine And Surgery	Des Moines, IA
40000	University of Alabama School of Optometry	Birmingham, AL
40010	University of California School of Optometry	Berkeley, CA
40020	Ferris State College of Optometry	Big Rapids, MI
40030	University Of Houston School of Optometry	Houston, TX
40040	Illinois College of Optometry at Chicago	Chicago, IL
40050	Indiana University School of Optometry	Bloomington, IN
40060	International American University at Puerto Rico School of Optometry	San Juan, Puerto Rico
40070	University of Missouri School of Optometry	St. Louis, MO
40080	University of Montreal School of Optometry	Montreal, Canada
40090	New England College of Optometry	Boston, MA
40100	Berkeley Northeastern State University College of Optometry	Tahlequah, OK
40110	State University of New York School of Optometry	New York, NY
40120	Ohio State University School of Optometry	Columbus, OH
40130	Pacific University School of Optometry	Columbus, OH
40140	Pennsylvania College of Optometry	Philadelphia, PA
40150	Southern California College of Optometry	Fullerton, CA
04160	Southern College of Optometry	Memphis, TN
40170	University of Waterloo School of Optometry	Ontario, Canada
50000	Chiropractic Unknown School	
50010	Adio/Pennsylvania College of Straight Chiropractic	Levittown, PA
50020	Atlantic State/Columbia Chiropractic	Brooklyn, NY
50030	Bebout College of Chiropractic	Indianapolis, IN
50040	Booker T. Washington Chiropractic	Kansas City, MO
50050	Logan College of Chiropractic	Oklahoma City, OK
50060	Los Angeles Chiropractic	Los Angeles, CA
50065	Central States Physiatrics and Chiropractic	Eaton, OH
50070	Canadian Memorial Chiropractic	Toronto, Ontario
50080	Chiropractic Institute of New York	New York, NY
50090	Crisco Chiropractic	Crisco, TX
50100	Cleveland Chiropractic College of Cleveland University--Los Angeles	Los Angeles, CA
50110	Cleveland Chiropractic College	Kansas City, MO
50120	Columbia Chiropratic	Baltimore, MD
50130	Columbia Chiropratic	Alameda, CA

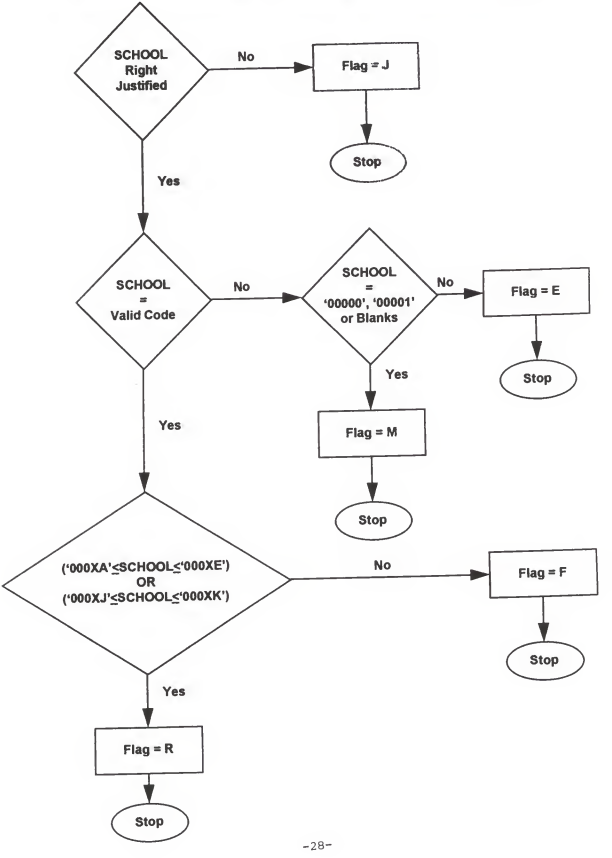
EXHIBIT 2-1 (continued)

REGISTRY SCHOOL CODES

HCFA ID	SCHOOL	LOCATION
50140	Columbia Chiropractic and Naturopathy	Sacramento, CA
50150	Columbia Institute of Chiropratic	New York, NY
50160	Hollywood Chiropractic	Hollywood, CA
50170	Lafayette Chiropractic Institute	Philadelphia, PA
50180	Life Chiropractic College-West	San Lorenzo, CA
50190	Lincoln Chiropractic	Marietta, GA
50200	Reaver School Chiropractic	Dayton, OH
50210	Restview Chiropractic	Seattle, WA
50220	San Francisco Chiropractic	San Francisco, CA
50230	Sherman Straight Chiropractic	Spartanburg, SC
50240	Western States Chiropractic College	Portland, OR
50250	University of Pasadena Chiropractic	Pasadena, CA
50260	Natural Healing Chiropractic	Denver, CO
50270	National College of Chiropractic	Lombard, IL
50280	New York Chiropractic College	Glen Head, NY
50290	Northwestern College of Chiropractic	Bloomington, MN
50300	Palmer College of Chiropractic	Davenport, IA
50310	Palmer College of Chiropractic-West	West Sunnyvale, CA

Note: It appears that three codes have been assigned to the medical school at the University of California at Irvine (see shaded lines on first page of this exhibit).

FLOWCHART FOR
MEDICAL SCHOOL CODE (SCHOOL) INTEGRITY



```
 /*********************************************************/
 /*                                                       */
 /* -Check school code                                    */
 /*                                                       */
 /*********************************************************/

DATA S ;
 SET IN.JUL0293
      (KEEP=SETMDSCH);


 /* SETTING MEDICAL SCHOOL CODE (SETMDSCH) */

 IF SETMDSCH IN ('00102','00104','00106','00301','00401','00402',
                 '00501','00502','00504','00505','00506','00507',
                 '00508','00509','00511','00512','00513','00514',
                 '00515','00516','00517','00518','00519','00576',
                 '00702','00705','00801','00802','01001','01002',
                 '01003','01102','01103','01104','01175','01201',
                 '01205','01209','01211','01212','01218','01219',
                 '01221','01222','01401','01601','01602','01604',
                 '01605','01606','01608','01609','01610','01611',
                 '01613','01614','01615','01616','01617','01618',
                 '01619','01622','01623','01642','01643','01644',
                 '01645','01675','01705','01708','01709','01717',
                 '01718','01720','01801','01803','01804','01806',
                 '01808','01810','01875','01902','01903','01904',
                 '01907','02001','02002','02004','02005','02007',
                 '02008','02009','02011','02012','02101','02104',
                 '02105','02106','02201','02275','02301','02303',
                 '02304','02305','02306','02307','02308','02309',
                 '02311','02312','02401','02405','02406','02407',
                 '02415','02416','02501','02505','02507','02508',
                 '02512','02576','02604','02605','02607','02608',
                 '02701','02702','02801','02802','02803','02805',
                 '02807','02808','02810','02820','02822','02826',
                 '02828','02830','02833','02834','02835','02843',
                 '02844','02845','02846','02878','02879','03004',
                 '03005','03006','03007','03101','03201','03305',
                 '03306','03375','03401','03501','03503','03506',
                 '03508','03509','03510','03511','03513','03515',
                 '03519','03520','03543','03545','03546','03547',
                 '03548','03575','03601','03603','03604','03605',
                 '03607','03608','03701','03801','03802','03803',
                 '03806','03808','03809','03811','03819','03823',
                 '03825','03826','03840','03841','03843','03844',
                 '03845','03875','03901','03905','03979','04001',
                 '04002','04101','04102','04107','04109','04111',
                 '04112','04113','04114','04177','04201','04202',
                 '04203','04204','04301','04501','04504','04601',
                 '04701','04705','04706','04707','04708','04709',
                 '04710','04711','04713','04714','04715','04720',
                 '04802','04803','04804','04805','04806','04807',
                 '04812','04813','04814','04815','04816','04878',
                 '04901','05002','05101','05104','05106','05107',
                 '05404','05415','05501','05502','05575','05602',
```

```
              '05603','05605','05606','000XF','000XG',
              '000XH','000XI','30000','30100','30200','30300',
              '30400','30500','30600','40000','40010','40020',
              '40030','40040','40050','40060','40070','40080',
              '40090','40100','40110','40120','40130','40140',
              '40150','04160','40170','50000','50010','50020',
              '50030','50040','50050','50060','50065','50070',
              '50080','50090','50100','50110','50120','50130',
              '50140','50150','50160','50170','50180','50190',
              '50200','50210','50220','50230','50240','50250',
              '50260','50270','50280','50290','50300','50310',
              '99999','10000','20000')
              THEN HMEDSCHS='F';
  ELSE IF SETMDSCH^=RIGHT(SETMDSCH) THEN HMEDSCHS='J';
  ELSE IF SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                       '000XJ','000XK') THEN HMEDSCHS='R';
  ELSE IF SETMDSCH IN ('     ','00000','00001') THEN HMEDSCHS='M';
  ELSE HMEDSCHS='E';
  OUTPUT S;

RUN;
PROC FREQ DATA=S ORDER=FREQ; TABLES HMEDSCHS;
 TITLE1 '**** SETTING ****';
RUN;
```

DATA ELEMENT: GRADUATION YEAR

Graduation year is a required data element. Values are often missing; year equal to zero frequently occurs. Completely erroneous codes occur less frequently (e.g., year equal to 96).

Data Format:

Carrier Record: PIC 9(02); Component Order: YY
Registry File: PIC S9(09) COMP-3; Component Order: YY

Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
J	Not properly justified	not right justified
F	Feasible	40≤graduation year≤93
D	Dubious	30≤graduation year≤39
M	Missing	year=0 or 99
E	Erroneous	all other values (including 1930-1933)

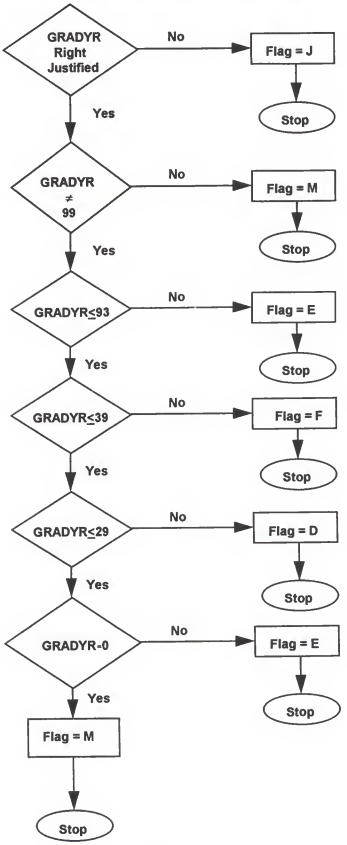
Notes:

(1) In 1993, a graduation year of 39 implies an age of 79 (assuming graduation at age 25). While plausible, providers aged 79-89 should be reviewed for claim activity.

(2) The upper and lower bounds for the feasible and dubious criteria should be annually adjusted upward by one.

(3) Note that the carrier record and Registry file have different COBOL pictures (see Exhibit 1-1).

FLOWCHART FOR GRADUATION YEAR (GRADYR) INTEGRITY



```
 /*********************************************************/
 /*                                                       */
 /* -Check graduation year                                */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=SETGRDYR);


  /* SETTING GRADUATION YEAR (SETGRDYR) */

 IF 40<=SETGRDYR<=93 THEN HGRADYRS='F';
 ELSE IF SETGRDYR^=RIGHT(SETGRDYR) THEN HGRADYRS='J';
 ELSE IF 30<=SETGRDYR<=39 THEN HGRADYRS='D';
 ELSE IF SETGRDYR IN (0,99,.) THEN HGRADYRS='M';
 ELSE HGRADYRS='E';
 OUTPUT S;

RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES HGRADYRS;
 TITLE1 '**** SETTING ****';
RUN;
```

DATA ELEMENT: SPECIALTY CODE

The primary specialty code is a required data element, but the secondary is not. Although feasible, use of codes equal to 49 (miscellaneous) or 99 (unknown) occurs too frequently.

Data Format:

Carrier Record: PIC 9(02)
Registry File: PIC X(02)

Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
F	Feasible	01-08,10-14,16,18-20,22,24-26, 28-30,33-41,44,46,48,66,70,76-79, 81-86, 90-94
R	Retired	9,15,17,21,23,27,31,32
U	Unknown	99
S	Miscellaneous	49
M	Missing	0, 00, or blank
E	Erroneous	all other values

Notes:

(1) The value 00 is considered missing because of carrier instructions.

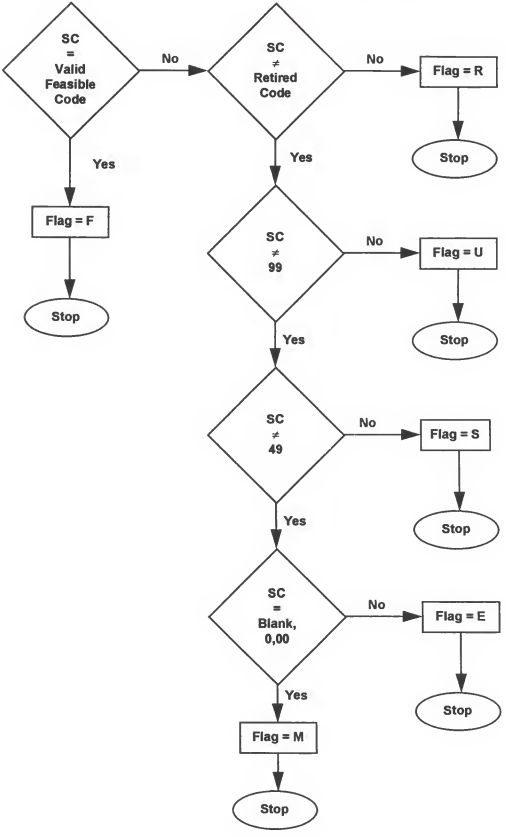
(2) Other specialty codes (not in F, R, U, or S) are considered erroneous since they are for providers not covered by the Registry.

(3) Although a valid code in the past, the miscellaneous code (49) should no longer be used for UPIN providers.

(4) Except for 12, osteopathic codes were re-assigned in October 1991:

Old	New Assignment
09	16
15	16
17	18 or 04
21	22
23	76
27	86
31	30
32	92

FLOWCHART FOR PRIMARY SPECIALTY CODE (SC) INTEGRITY



```
 /*********************************************************/
 /*                                                       */
 /* -Check specialty codes                                */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=SPEC1 SPEC2);

 /* PRIMARY SPECIALTY (SPEC1) */

 IF ('01'<=SPEC1<='08') OR ('10'<=SPEC1<='14') OR ('18'<=SPEC1<='20') OR
    ('24'<=SPEC1<='26') OR ('28'<=SPEC1<='30') OR ('33'<=SPEC1<='41') OR
    (SPEC1 IN ('16','22','44','46','48','66','70')) OR
    ('76'<=SPEC1<='79') OR ('81'<=SPEC1<='86') OR ('90'<=SPEC1<='94')
    THEN HSPEC1='F';
 ELSE IF SPEC1 IN ('09','15','17','21','23','27','31','32') THEN HSPEC1='R';
 ELSE IF SPEC1 IN ('  ',' 0','00') THEN HSPEC1='M';
 ELSE IF SPEC1='99' THEN HSPEC1='U';
 ELSE IF SPEC1='49' THEN HSPEC1='S';
 ELSE HSPEC1='E';

 /* SECONDARY SPECIALTY (SPEC2) */

 IF ('01'<=SPEC2<='08') OR ('10'<=SPEC2<='14') OR ('18'<=SPEC2<='20') OR
    ('24'<=SPEC2<='26') OR ('28'<=SPEC2<='30') OR ('33'<=SPEC2<='41') OR
    (SPEC2 IN ('16','22','44','46','48','66','70')) OR
    ('76'<=SPEC2<='79') OR ('81'<=SPEC2<='86') OR ('90'<=SPEC2<='94')
    THEN HSPEC2='F';
 ELSE IF SPEC2 IN ('09','15','17','21','23','27','31','32') THEN HSPEC2='R';
 ELSE IF SPEC2 IN ('  ',' 0','00') THEN HSPEC2='M';
 ELSE IF SPEC2='99' THEN HSPEC2='U';
 ELSE IF SPEC2='49' THEN HSPEC2='S';
 ELSE HSPEC2='E';

RUN;

PROC FREQ ORDER=FREQ; TABLES HSPEC1 HSPEC2;
RUN;
```

DATA ELEMENT: SANCTION CODE

Sanction code should be present if available. Of the approximately four thousand entered codes, about 25% are in the unknown category (see Table 2-1).

Data Format:

PIC X(01) for both carrier record and Registry File.

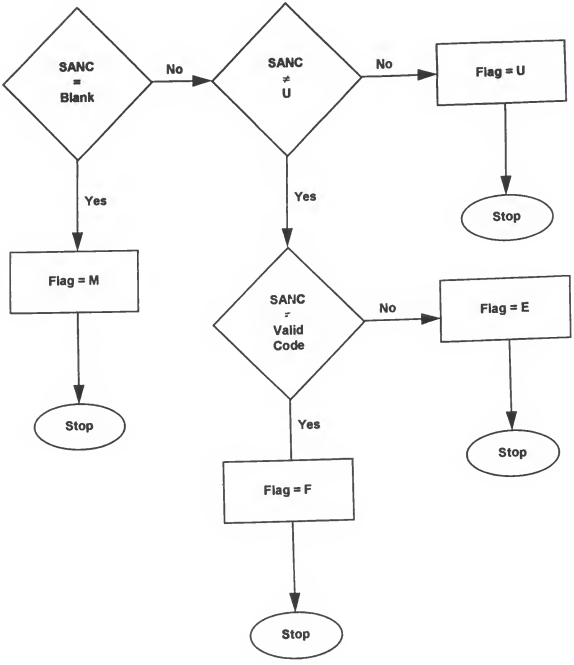
Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
F	Feasible	A through R
U	Unknown	U
M	Missing (See Note)	Blank
E	Erroneous	all other values

Note:

(1) A blank is used to indicate that a provider is not sanctioned; therefore, the blank value is not considered a missing value. The only time a blank value might be indicative of a problem is when sanction date or length have feasible values; however, this algorithm is not intended to evaluate a blank in relation to data in the sanction date or sanction length fields.

FLOWCHART FOR SANCTION CODE (SANC) INTEGRITY



```
 /*********************************************************/
 /*                                                       */
 /* -Check sanction code                                  */
 /*                                                       */
 /*********************************************************/

DATA S ;
 SET IN.JUL0293
       (KEEP=SANC2);


 /* SETTING SANCTION CODE (SANC2) */

 IF 'A'<=SANC2<='R' THEN HSANCS='F';
 ELSE IF SANC2=' ' THEN HSANCS='M';
 ELSE IF SANC2='U' THEN HSANCS='U';
 ELSE HSANCS='E';
 OUTPUT S;

RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES HSANCS;
 TITLE1 '**** SETTING ****';
RUN;
```

DATA ELEMENT: SANCTION DATE

Sanction date should be present if available. Implausible dates frequently occur, especially years prior to the establishment of Medicare or after 1993.

Data Format:

For both Carrier Record and Registry File: PIC 9(04); Component Order: MMYY

Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
F	Feasible	$66 \leq year \leq 93$ and $1 \leq month \leq 12$
M	Missing	0 or blank
E	Erroneous	all other values

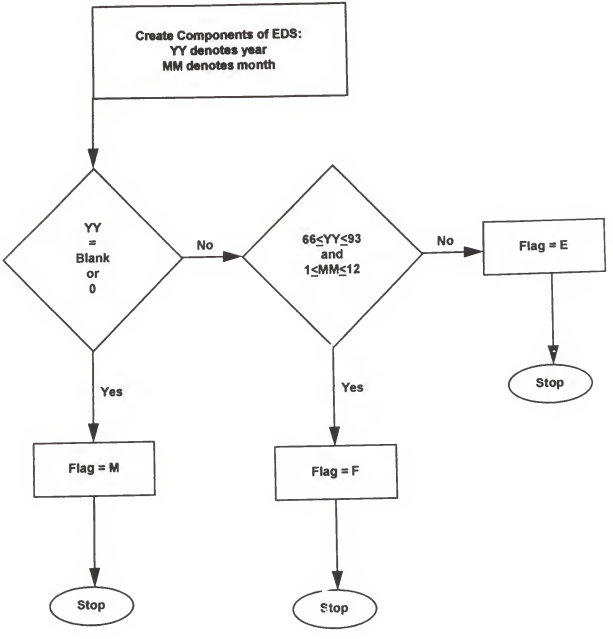
Notes:

(1) The upper bound of feasible years needs to be annually incremented upward.

(2) Similar to sanction code, non-sanctioned providers should have a zero or blank, which normally should not be considered a missing value.

(3) If the year component of the date is zero or blank, then the sanction date is flagged as missing, regardless of the contents of the month field.

FLOWCHART FOR EFFECTIVE DATE OF SANCTION (EDS) INTEGRITY



```
 /*********************************************************/
 /*                                                       */
 /* -Check sanction date                                  */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JULO293
       (KEEP=SANC2DAT);

 /* EFFECTIVE DATE OF SANCTION (SANC2DAT) */

IF SANC2DAT^=. THEN DO;
 SANC2MO = SUBSTR(SANC2DAT,9,2);
 SANC2YR = SUBSTR(SANC2DAT,11,2);
END;

 IF SANC2DAT IN (0,.) THEN HSANCDTS='M';
 ELSE IF ('66'<=SANC2YR<='93') & (' 1'<=SANC2MO<='12') & SANC2MO^='00'
  THEN HSANCDTS='F';
 ELSE HSANCDTS='E';
 OUTPUT S;

RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES HSANCDTS;
 TITLE1 '**** SETTING ****';
RUN;
```

DATA ELEMENT: SANCTION LENGTH

Sanction length should be present if available. The list of sanctioned providers issued by HCFA's Office of the Inspector General (OIG) includes the sanction term (length) as well as the type of sanction and the effective date. Sanction terms longer than 15 years are incremented by five. Since formal guidelines for coding sanction length have not been issued, rather than denote values such as 16 as erroneous, they have been classified as dubious.

Data Format:

Carrier Record: PIC 9(02)
Registry File: PIC S9(03) COMP-3

Flag assignment hierarchy, in descending order of priority:

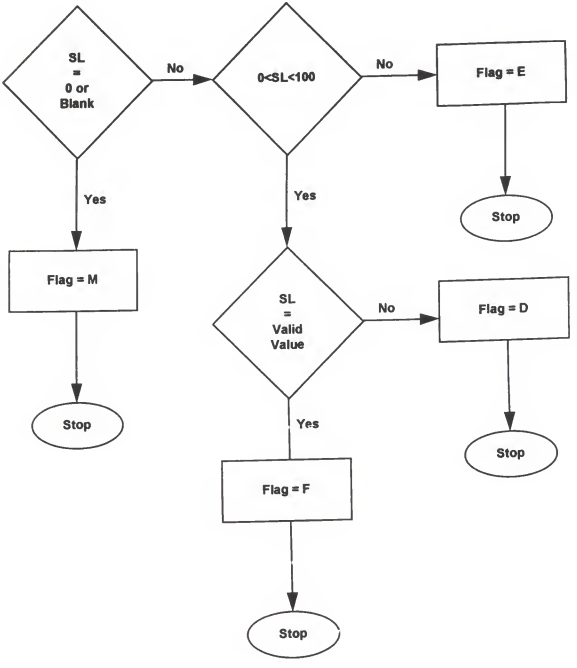
Flag	Definition	Criteria
F	Feasible	1-15, 20, 25, 30, 35, 40, 45, 50, or 99
D	Dubious	16-19, 21-24, 26-29, 31-34, 36-39, 41-44, 46-49, 51-98
M	Missing	0 or blank
E	Erroneous	length ≤ 0 or length ≥ 100

Notes:

(1) Starting with sanction length 15, sanction length increments by five years. A value of 99 indicates an indefinite sanction length.

(2) As with sanction date, non-sanctioned providers should have a zero or blank and, thus should not be considered a missing value.

FLOWCHART FOR SANCTION LENGTH (SL) INTEGRITY



```
/*******************************************************/
/*                                                     */
/* -SANCTION LENGTH INTEGRITY CHECKS                   */
/*                                                     */
/*******************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=SANC2YRS);


/* SETTING LENGTH OF SANCTION (SANC2YRS) */

IF (1<=SANC2YRS<=15) OR (SANC2YRS IN (20,25,30,35,40,45,50,99))
  THEN HSANCYRS='F';
 ELSE IF SANC2YRS IN (0,.) THEN HSANCYRS='M';
 ELSE IF (16<=SANC2YRS<=19) OR (21<=SANC2YRS<=24) OR
         (26<=SANC2YRS<=29) OR (31<=SANC2YRS<=34) OR
         (36<=SANC2YRS<=39) OR (41<=SANC2YRS<=44) OR
         (46<=SANC2YRS<=49) OR (51<=SANC2YRS<=98)
  THEN HSANCYRS='D';
 ELSE HSANCYRS='E';
 OUTPUT S;

RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES HSANCYRS;
 TITLE1 '**** SETTING ****';
RUN;
```

DATA ELEMENT: PROVIDER CREDENTIALS

Provider credentials are a required data element and should be left-justified.

Data Format:

PIC X(03) for both Carrier Record and Registry File.

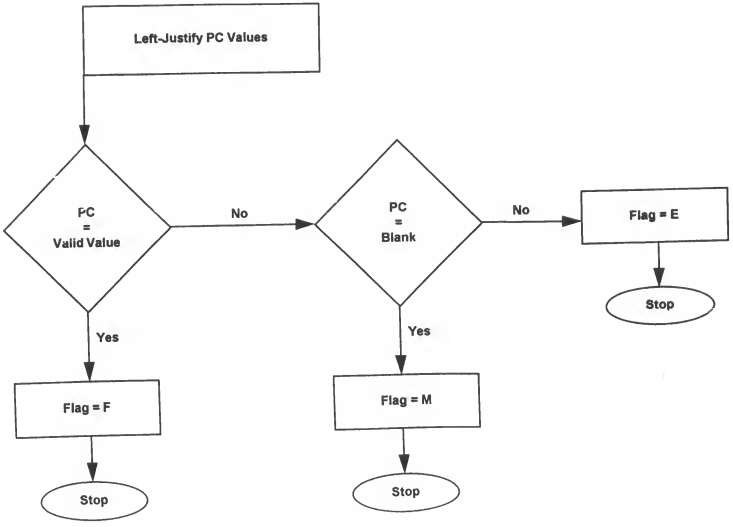
Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
F	Feasible	MD, DO, DDS, DDM, DPM, CH, or OD
M	Missing	blank
E	Erroneous	all other values

Note:

(1) We had already left-justified the data element before analyzing it, therefore we did not include a justification test.

FLOWCHART FOR PROVIDER CREDENTIALS (PC) INTEGRITY



```
 /*********************************************************/
 /*                                                       */
 /* -Check integrity of provider credentials              */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=CREDENTL);

 /*  PROVIDER CREDENTIALS (CREDENTL) */

 IF CREDENTL IN ('MD ','DO ','DDM','DDS','DPM','CH ','OD ') THEN HCREDNTL='F';
 ELSE IF CREDENTL='    ' THEN HCREDNTL='M';
 ELSE HCREDNTL='E';

RUN;

PROC FREQ ORDER=FREQ; TABLES HCREDNTL ;
RUN;
```

DATA ELEMENT: PHYSICIAN STATUS

Physician status is a required data element.

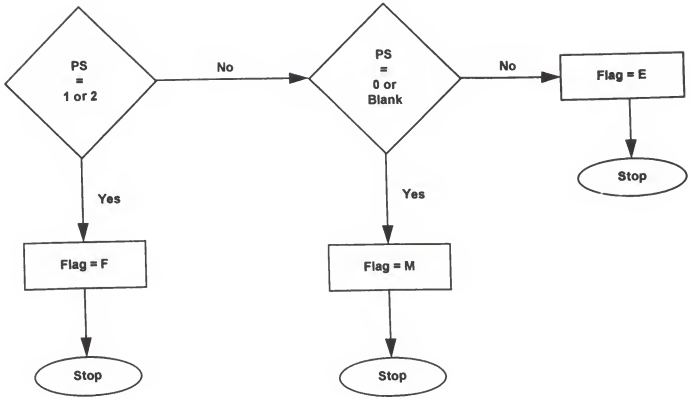
Data Format:

Carrier Record: PIC 9
Registry File: PIC X(01)

Flag assignment hierarchy, in descending order of priority:

Flag	Definition	Criteria
F	Feasible	1 or 2
M	Missing	0 or blank
E	Erroneous	all other values

FLOWCHART FOR PHYSICIAN STATUS (PS) INTEGRITY



```
 /*********************************************************/
 /*                                                       */
 /* -Check the integrity of  physician status             */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=PHYSSTAT);

 /* PHYSICIAN STATUS (PHYSSTAT) */

 IF PHYSSTAT IN ('1','2') THEN HPHYSTAT='F';
 ELSE IF PHYSSTAT IN ('0',' ') THEN HPHYSTAT='M';
 ELSE HPHYSTAT='E';
RUN;

PROC FREQ ORDER=FREQ; TABLES HPHYSTAT;
RUN;
```

CHAPTER 3

LOGICAL CONSISTENCY BETWEEN DATA ELEMENTS

INTRODUCTION

One of the potential problems that can occur in a provider file is logical inconsistency between data elements (variables) within a single record. An example of a logical inconsistency is when the provider status variable indicates that the provider is a physician or an osteopath while the provider credential variable indicates that the provider is an optometrist. In this particular example, both of the variables have feasible values. It is not immediately clear, however, which of the variables is improperly coded. In some instances, the value of a third variable might help resolve the conflict while in other cases, it would be necessary for the carrier to check its hard copy files and/or directly contact the provider.

This chapter specifies the logically consistent values for pairs of data elements. Flowcharts and SAS programs implementing the specifications are also included. The specifications for each pair of data elements have several subsections. First, for each pair of data elements for which comparisons are to be made, an example of an inconsistency is given. Next, specifications for consistent values are provided. These specifications are based upon the data integrity tests presented in the previous chapter. Therefore it is necessary to first implement the data element integrity algorithms described in Chapter 2. In this chapter, the flowcharts do not include the data integrity checks, but the SAS programs do include them. (For example, at the beginning of the flowchart for the logical consistency between physician status and provider credentials, there is a test of whether the respective flag values of these two data elements are both equal to F, thus assuming that the flag variables have been created. The SAS code on the following page, however, includes the creation of these two flag variables.)

The logical comparisons between pairs of data elements are not limited to the strictly feasible values as defined in Chapter 2. The flag values for specialty codes in Chapter 2, for instance, included *R* (retired), *U* (unknown), and *S* (miscellaneous). These flag values for specialty code denote instances in which codes are still being used but do not meet the strict criteria necessary to be denoted as feasible (code F). Rather than collectively referring to codes

F, R, U, and S as *feasible*, to avoid confusion, they are collectively referred to as *acceptable*. Codes not designated as *acceptable* are designated as *unacceptable*. Some codes such as *M* (missing) sometimes are acceptable (e.g., sanction code) while for other data elements (e.g., specialty code), are not. The reason is that for data elements such as sanction code, the missing value code has two roles (see Chapter 2 for examples).

For each pair of data elements, acceptable values are compared as indicated in the specifications. They are either consistent or inconsistent. If one of the data elements has an unacceptable value, then it is not compared to an acceptable value. The logical consistency flag (LCF) consists of four values:

LCF	Criteria
N	One or both data elements have *unacceptable* values
K	Consistent *acceptable* values
I	Inconsistent *acceptable* values
blank	Values not compared (only for school code compared to graduation year)

The flowcharts indicate how the flag variables for each pair of data element values should be coded as K, I, or N. (A blank flag value is only used for schools other than medical schools when comparing graduation date to the open/close dates of medical schools.)

Results from the SAS programs are presented in Table 3-1.

TABLE 3-1

RESULTS OF IMPLEMENTING ALGORITHMS TO CHECK THE LOGICAL CONSISTENCY BETWEEN PAIRS OF DATA ELEMENTS

Data Element Pairs	***COMPARISON BETWEEN ACCEPTABLE VALUES:*** Consistent	Inconsistent	At least one data element unacceptable	Total
Provider credentials and physician status	1,998,957	109	2	1,999,068
Sanction code and sanction date	1,997,208	1,661	199	1,999,068
Sanction code and sanction length	1,997,157	1,911	0	1,999,068
Sanction date and sanction length	1,998,731	138	199	1,999,068
Provider credential and primary specialty code	1,994,945	4,122	1	1,999,068
Provider credential and secondary specialty code	113,552	699	1,884,817 [a]	1,999,068
Physician status and primary specialty code	1,996,328	2,738	2	1,999,068
Physician status and secondary specialty code	113,716	535	1,884,817 [a]	1,999,068
Provider credentials and school type	1,602,187	23,695	373,186 [b]	1,999,068
Physician status and school type	1,625,165	716	373,187 [b]	1,999,068
School type and primary specialty code	1,620,409	5,473	373,186 [b]	1,999,068
School type and secondary specialty code	87,566	512	1,910,990 [c]	1,999,068
Birth year and graduation year	1,427,148	98,913	473,007 [c]	
Graduation date and medical school open/close dates	976,464	15,439	53,821 [d]	1,045,724

Notes:

[a] High value mostly attributable to missing values for secondary specialty code.
[b] High value mostly attributable to missing values for school code.
[c] High value mostly attributable to missing values for both data elements.
[d] High value mostly attributable to missing values for graduation date.

LOGICAL CONSISTENCY: PHYSICIAN STATUS AND PROVIDER CREDENTIALS

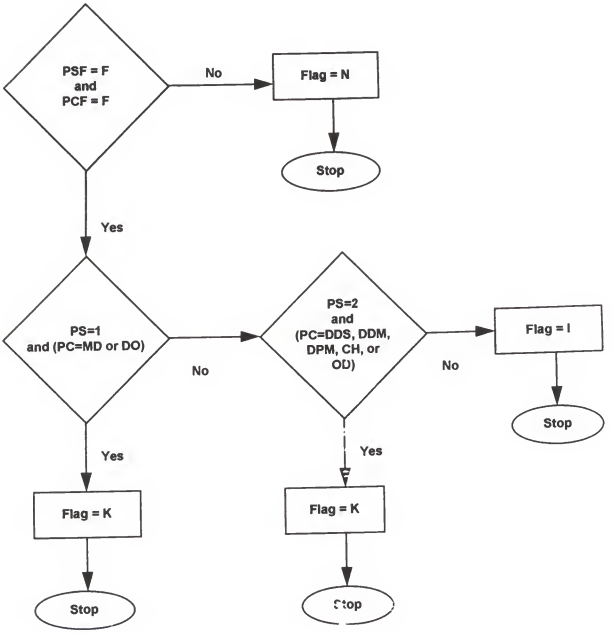
An example of a logical inconsistency is when physician status indicates the provider is a physician or osteopath but the provider credential indicates a podiatrist.

Logically consistent values of physician status (PS) and provider credentials (PC) are:

PS	PC
1	MD or DO
2	DDS, DDM, DPM, CH, or OD

If an inconsistency is found, values of both data elements need to be checked.

FLOWCHART FOR LOGICAL CONSISTENCY BETWEEN PHYSICIAN STATUS AND PROVIDER CREDENTIALS



Notes:

PS denotes physician status
PSF denotes physician status flag
PC denotes provider credentials
PCF denotes provider credentials flag

```
 /*********************************************************/
 /*                                                       */
 /* -Check consistency between physician status &         */
 /*                            provider credentials       */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=PHYSSTAT CREDENTL);

 /* LOGICAL CONSISTENCY:                                                */
 /* PHYSICIAN STATUS (PHYSSTAT) & PROVIDER CREDENTIALS (CREDENTL) */

 IF CREDENTL IN ('MD ','DO ','DDM','DDS','DPM','CH ','OD ') THEN HCREDNTL='F';
 ELSE IF CREDENTL='   ' THEN HCREDNTL='M';
 ELSE HCREDNTL='E';

 IF PHYSSTAT IN ('1','2') THEN HPHYSTAT='F';
 ELSE IF PHYSSTAT IN ('0',' ') THEN HPHYSTAT='M';
 ELSE HPHYSTAT='E';

 IF (CREDENTL IN ('MD ','DO ') & (PHYSSTAT='1')) OR
    (CREDENTL IN ('DDS','DDM','DPM','CH ','OD ') & (PHYSSTAT='2'))
     THEN LCF='K';
 ELSE IF HCREDNTL^='F' OR HPHYSTAT^='F' THEN LCF='N';
 ELSE LCF='I';
RUN;

PROC FREQ ORDER=FREQ; TABLES HCREDNTL HPHYSTAT LCF;
RUN;
```

LOGICAL CONSISTENCY: SANCTION CODE and SANCTION DATE

An example of an inconsistency is when the sanction code has value between A and R and the sanction date field has a value of zero. A zero indicates that either the provider is not sanctioned or, if sanctioned, that the carrier does not know the date.

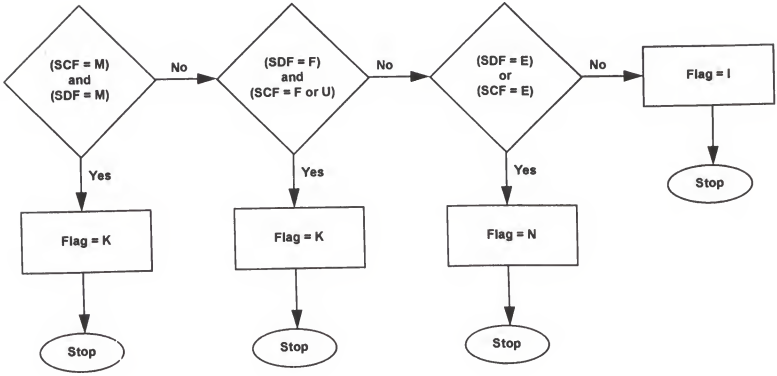
The sanction code flag (SCF) has three acceptable values: M, F, or U. The sanction date flag (SDF) has two acceptable values: M or F.

Logically consistent values of SCF and SDF are:

SDF	SCF
M	M
F	F or U

If an inconsistency is found, values of both data elements and sanction length need to be checked.

FLOWCHART FOR THE LOGICAL CONSISTENCY BETWEEN SANCTION CODE AND SANCTION DATE



Notes:

SCF denotes sanction code flag
SDF denotes sanction date flag

```
 /*********************************************************/
 /*                                                       */
 /*  Checking logical consistency between sanction code  */
 /*                                  & sanction date      */
 /*                                                       */
 /*********************************************************/

DATA S(KEEP=LCFS);
 SET IN.JUL0293
      (KEEP= SANC2 SANC2DAT);

 /* LOGICAL CONSISTENCY:                                          */
 /* SANCTION CODE (SANC2) & SANCTION DATE (SANC2DAT) */


 /* SETTING SANCTION CODE (SANC2) */

 IF 'A'<=SANC2<='R' THEN HSANCS='F';
 ELSE IF SANC2=' ' THEN HSANCS='M';
 ELSE IF SANC2='U' THEN HSANCS='U';
 ELSE HSANCS='E';

 /* SETTING EFFECTIVE DATE OF SANCTION (SANC2DAT) */

IF SANC2DAT^=. THEN DO;
 SANC2MO = SUBSTR(SANC2DAT,9,2);
 SANC2YR = SUBSTR(SANC2DAT,11,2);
END;

 IF ('66'<=SANC2YR<='93') & (' 1'<=SANC2MO<='12') & SANC2MO^='00'
  THEN HSANCDTS='F';
 ELSE IF SANC2DAT IN (0,.) THEN HSANCDTS='M';
 ELSE HSANCDTS='E';

 IF (HSANCS='M' & HSANCDTS='M') OR
    ((HSANCS IN ('F','U')) & (HSANCDTS='F')) THEN LCFS='K';
 ELSE IF HSANCS='E' OR HSANCDTS='E' THEN LCFS='N';
 ELSE LCFS='I';

 OUTPUT S;
RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES LCFS;
 TITLE1 '**** SETTING ****';
RUN;
```

LOGICAL CONSISTENCY: SANCTION CODE and SANCTION LENGTH

An example of an inconsistency is when the sanction code has value between A and R and the sanction length field has a value of zero. A zero indicates that either the provider is not sanctioned or, if sanctioned, that the carrier does not know how many years the sanction was to be in effect.

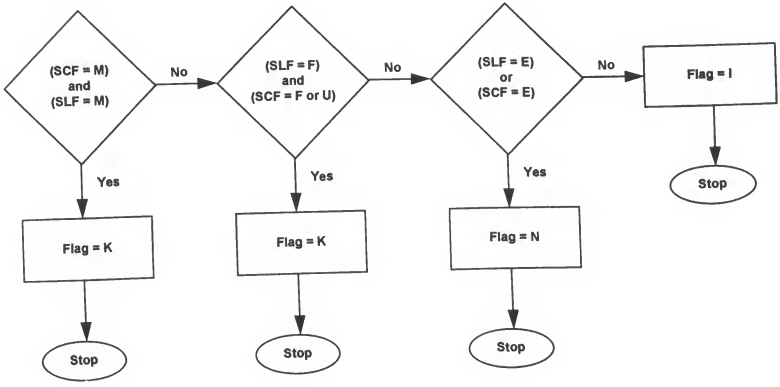
The sanction code flag (SCF) has three acceptable values: M, F, or U. The sanction length flag (SLF) has two acceptable values: M or F.

Logically consistent values of SCF and SLF are:

SLF	SCF
M	M
F	F or U

If an inconsistency is found, values of both data elements and sanction date need to be checked.

FLOWCHART FOR THE LOGICAL CONSISTENCY BETWEEN SANCTION CODE AND SANCTION LENGTH



Notes:

SCF denotes sanction code flag
SLF denotes sanction length flag

```
 /*********************************************************/
 /*                                                       */
 /*  Check logical consistency between sanction code &    */
 /*                                    sanction length    */
 /*                                                       */
 /*********************************************************/

DATA S(KEEP=LCFS) ;
 SET IN.JUL0293
      (KEEP=SANC2 SANC2YRS);

 /* LOGICAL CONSISTENCY:                                                */
 /* SANCTION CODE (SANC2) & SANCTION LENGTH (SANC2YRS) */


 /* SETTING SANCTION CODE (SANC2) */

 IF 'A'<=SANC2<='R' THEN HSANCS='F';
 ELSE IF SANC2=' ' THEN HSANCS='M';
 ELSE IF SANC2='U' THEN HSANCS='U';
 ELSE HSANCS='E';

 /* SETTING LENGTH OF SANCTION (SANC2YRS) */

 IF (1<=SANC2YRS<=13) OR (SANC2YRS IN (15,20,25,30,35,40,45,50,99))
  THEN HSANCYRS='F';
 ELSE IF SANC2YRS IN (0,.) THEN HSANCYRS='M';
 ELSE IF SANC2YRS=14 OR (16<=SANC2YRS<=19) OR (21<=SANC2YRS<=24) OR
         (26<=SANC2YRS<=29) OR (31<=SANC2YRS<=34) OR
         (36<=SANC2YRS<=39) OR (41<=SANC2YRS<=44) OR
         (46<=SANC2YRS<=49) OR (51<=SANC2YRS<=98)
  THEN HSANCYRS='D';
 ELSE HSANCYRS='E';

 IF (HSANCS='M' & HSANCYRS='M') OR
     ((HSANCS IN ('F','U')) & (HSANCYRS='F')) THEN LCFS='K';
 ELSE IF HSANCS='E' OR HSANCYRS='E' THEN LCFS='N';
 ELSE LCFS='I';

 OUTPUT S;
RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES LCFS;
 TITLE1 '**** SETTING ****';
 TITLE2 '**** LOG. CONSISTENCY: SANCTION CODE & SANCTION LENGTH ****';
RUN;
```

LOGICAL CONSISTENCY: SANCTION DATE and SANCTION LENGTH

An example of an inconsistency is when sanction length is equal to a value such as 10 and sanction date has a value of zero. A zero indicates that either the provider is not sanctioned or that the carrier does not know what date the sanction took effect.

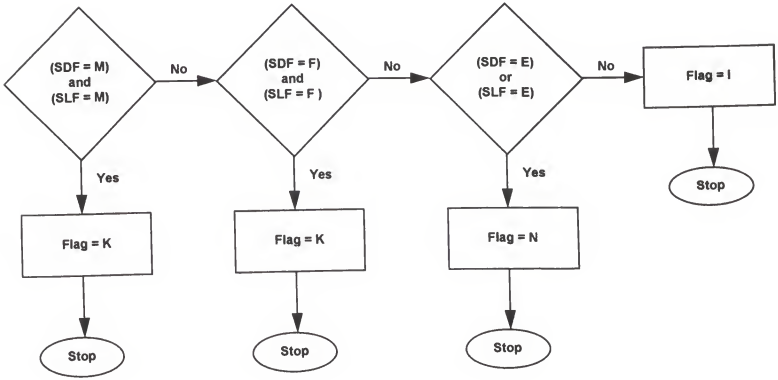
The sanction date flag (SDF) has three acceptable values: M or F. The sanction length flag (SLF) has two acceptable values: M or F.

Logically consistent values of SDF and SLF are:

SLF	SDF
M	M
F	F

If an inconsistency is found, values of both data elements and sanction code need to be checked.

FLOWCHART FOR THE LOGICAL CONSISTENCY BETWEEN SANCTION DATE AND SANCTION LENGTH



Notes:
SCF denotes sanction code flag
SLF denotes sanction length flag

```
 /*********************************************************/
 /*                                                       */
 /* -Check logical consistency between sanction date &    */
 /*                                   sanction length     */
 /*********************************************************/

DATA S(KEEP=LCFS) ;
 SET IN.JUL0293
       (KEEP=SANC2DAT SANC2YRS);

 /* LOGICAL CONSISTENCY:                                                */
 /* SANCTION DATE (SANC2DAT) & SANCTION LENGTH (SANC2YRS) */

 /* SETTING EFFECTIVE DATE OF SANCTION (SANC2DAT) */

IF SANC2DAT^=. THEN DO;
 SANC2MO = SUBSTR(SANC2DAT,9,2);
 SANC2YR = SUBSTR(SANC2DAT,11,2);
END;

 IF ('66'<=SANC2YR<='93') & (' 1'<=SANC2MO<='12') & SANC2MO^='00'
  THEN HSANCDTS='F';
 ELSE IF SANC2DAT IN (0,.) THEN HSANCDTS='M';
 ELSE HSANCDTS='E';

 /* SETTING LENGTH OF SANCTION (SANC2YRS) */

 IF (1<=SANC2YRS<=13) OR (SANC2YRS IN (15,20,25,30,35,40,45,50,99))
  THEN HSANCYRS='F';
 ELSE IF SANC2YRS IN (0,.) THEN HSANCYRS='M';
 ELSE IF SANC2YRS=14 OR (16<=SANC2YRS<=19) OR (21<=SANC2YRS<=24) OR
         (26<=SANC2YRS<=29) OR (31<=SANC2YRS<=34) OR
         (36<=SANC2YRS<=39) OR (41<=SANC2YRS<=44) OR
         (46<=SANC2YRS<=49) OR (51<=SANC2YRS<=98)
  THEN HSANCYRS='D';
 ELSE HSANCYRS='E';

 IF (HSANCDTS='M' & HSANCYRS='M') OR
    (HSANCDTS='F' & HSANCYRS='F') THEN LCFS='K';
 ELSE IF HSANCDTS='E' OR HSANCYRS='E' THEN LCFS='N';
 ELSE LCFS='I';

 OUTPUT S;
RUN;
FROC FREQ DATA=S ORDER=FREQ; TABLES LCFS;
 TITLE1 '**** SETTING ****';
 TITLE2 '**** LOG. CONSISTENCY: SANCTION DATE & SANCTION LENGTH ****';
RUN;
```

LOGICAL CONSISTENCY: PROVIDER CREDENTIALS and SPECIALTY CODE

An example of an inconsistency is when the specialty code indicates a physician specialty while the provider credential indicates a chiropractor.

Provider credentials (PC):

a. PC has 7 acceptable values: MD, DO, DDM, DDS, CH, DPM, OD

b. PC flag (PCF) has 1 acceptable value: F

Specialty code flag (SPF) has 3 acceptable values: F, S, or U

Specialty code needs to be re-coded as SPECS (see Exhibit 3-1). Logically consistent values of PC and SPECS are shown in Exhibit 3-2.

Notes:

(1) A value of 10 was assigned for SPECS to catch any erroneous specialty code that was not picked by the variable integrity screens.

(2) Because the secondary specialty code is not a required data element, it may be desirable to exclude from the comparisons cases in which the secondary specialty code is equal to zero (missing) or assign a blank value to the flag variable.

(3) For the purposes of the logical consistency tests, code *S* is acceptable but it is actually an obsolete code that should be replaced (see the notes to the specifications for specialty code in Chapter 2).

(4) For the purposes of the logical consistency tests, the retired osteopathy codes are included in code F. The flowchart does not make reference to such instances but the accompanying SAS program includes the appropriate coding.

(5) The data format for specialty code is different for the carrier record and the Registry file (see Chapter 1). Since the Registry version is alphanumeric, the accompanying SAS program includes some logic to recode blank fields as missing values and to recode the value 'b0' as zero (the lower case b indicates a blank).

If an inconsistency is found, check the values of physician status and the school code as well as provider credentials and specialty code.

EXHIBIT 3-1

RECODE OF SPECIALTY CODE

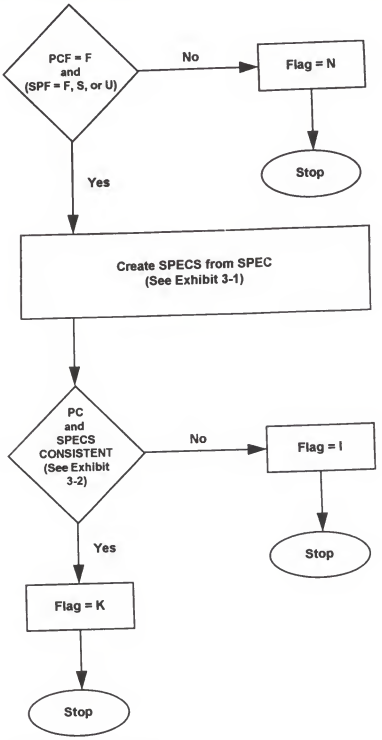
SPECS	SPECIALTY CODE	PROVIDER TYPE
1	01, 02, 03, 04, 05, 06, 07, 08, 10, 11, 13, 14, 16, 18, 20, 22, 24, 25, 26, 28, 29, 30, 33, 34, 36, 37, 38, 39, 40, 44, 46, 66, 70, 76, 77, 78, 79, 81, 82, 83, 84, 86, 90, 91, 92, 93, 94	Medical Doctor
2	09, 12, 15, 17 ,21, 23, 27, 31, 32	Osteopath
3	19	Dentist
4	85	Dentist
5	35	Chiropractor
6	48	Podiatrist
7	41	Optometrist
8	49	Miscellaneous
9	99	Unknown
10	all other values	Non-UPIN Specialties and non-assigned specialty codes

EXHIBIT 3-2

LOGICALLY CONSISTENT VALUES OF PROVIDER CREDENTIALS (PC) and SPECS

PC	SPECS
MD	1, 8, or 9
DO	1, 2, 8, or 9
DDM or DDS	3 or 4
CH	5
DPM	6
OD	7

FLOWCHART FOR LOGICAL CONSISTENCY OF PROVIDER CREDENTIAL AND SPECIALTY CODE



Notes:

PC denotes provider credential
PCF denotes provider credential flag
SPEC denotes specialty code
SPF denotes specialty code flag

```
 /*************************************************************/
 /*                                                           */
 /*  Check logical consistency between provider credentials */
 /*                                & specialty codes          */
 /*                                                           */
 /*************************************************************/

DATA S;
 SET IN.JUL0293
      (KEEP=SPEC1 SPEC2 CREDENTL);

 /* LOGICAL CONSISTENCY:                                      */
 /* PROVIDER CREDENTIALS (CREDENTL) & SPECIALTY CODE(SPEC1,SPEC2) */

 IF CREDENTL IN ('MD ','DO ','DDM','DDS','DPM','CH ','OD ') THEN HCREDNTL='F';
 ELSE IF CREDENTL='   ' THEN HCREDNTL='M';
 ELSE HCREDNTL='E';

 IF ('01'<=SPEC1<='41') OR (SPEC1 IN ('44','46','48','66','70')) OR
    ('76'<=SPEC1<='79') OR ('81'<=SPEC1<='86') OR ('90'<=SPEC1<='94')
    THEN HSPEC1='F';
 ELSE IF SPEC1 IN ('  ',' 0','00') THEN HSPEC1='M';
 ELSE IF SPEC1='99' THEN HSPEC1='U';
 ELSE IF SPEC1='49' THEN HSPEC1='S';
 ELSE HSPEC1='E';

 IF SPEC1='  ' THEN SPECS1=.;
 ELSE IF SPEC1=' 0' THEN SPECS1=0;
 ELSE IF SPEC1 IN
           ('01','02','03','04','05','06','07','08','10','11','13','14',
            '16','18','20','22','24','25','26','28','29','30','33',
            '34','36','37','38','39','40','44','46','66',
            '70','76','77','78','79','81','82','83','84','86','90',
            '91','92','93','94')
            THEN SPECS1=1;
 ELSE IF SPEC1 IN
           ('09','12','15','17','21','23','27','31','32') THEN SPECS1=2;
 ELSE IF SPEC1='19' THEN SPECS1=3;
 ELSE IF SPEC1='85' THEN SPECS1=4;
 ELSE IF SPEC1='35' THEN SPECS1=5;
 ELSE IF SPEC1='48' THEN SPECS1=6;
 ELSE IF SPEC1='41' THEN SPECS1=7;
 ELSE IF SPEC1='49' THEN SPECS1=8;
 ELSE IF SPEC1='99' THEN SPECS1=9;
 ELSE SPECS1=10;

 IF ('01'<=SPEC2<='41') OR (SPEC2 IN ('44','46','48','66','70')) OR
    ('76'<=SPEC2<='79') OR ('81'<=SPEC2<='86') OR ('90'<=SPEC2<='94')
    THEN HSPEC2='F';
 ELSE IF SPEC2 IN ('  ',' 0','00') THEN HSPEC2='M';
```

```
ELSE IF SPEC2='99' THEN HSPEC2='U';
ELSE IF SPEC2='49' THEN HSPEC2='S';
ELSE HSPEC2='E';

IF SPEC2='  ' THEN SPECS2=.;
ELSE IF SPEC2=' 0' THEN SPECS2=0;
ELSE IF SPEC2 IN
          ('01','02','03','04','05','06','07','08','10','11','13','14',
           '16','18','20','22','24','25','26','28','29','30','33',
           '34','36','37','38','39','40','44','46','66',
           '70','76','77','78','79','81','82','83','84','86','90',
           '91','92','93','94')
           THEN SPECS2=1;
ELSE IF SPEC2 IN
          ('09','12','15','17','21','23','27','31','32') THEN SPECS2=2;
ELSE IF SPEC2='19' THEN SPECS2=3;
ELSE IF SPEC2='85' THEN SPECS2=4;
ELSE IF SPEC2='35' THEN SPECS2=5;
ELSE IF SPEC2='48' THEN SPECS2=6;
ELSE IF SPEC2='41' THEN SPECS2=7;
ELSE IF SPEC2='49' THEN SPECS2=8;
ELSE IF SPEC2='99' THEN SPECS2=9;
ELSE SPECS2=10;

IF (CREDENTL='MD ' & (SPECS1 IN (1,8,9))) OR
   (CREDENTL='DO ' & (SPECS1 IN (1,2,8,9))) OR
   ((CREDENTL IN ('DDM','DDS')) & (SPECS1 IN (3,4))) OR
   (CREDENTL='CH ' & SPECS1=5) OR
   (CREDENTL='DPM' & SPECS1=6) OR
   (CREDENTL='OD ' & SPECS1=7) THEN HLCF1='K';
ELSE IF HCREDNTL^='F' OR (HSPEC1 NOT IN ('F','S','U')) THEN HLCF1='N';
ELSE HLCF1='I';
IF (CREDENTL='MD ' & (SPECS2 IN (1,8,9))) OR
   (CREDENTL='DO ' & (SPECS2 IN (1,2,8,9))) OR
   ((CREDENTL IN ('DDM','DDS')) & (SPECS2 IN (3,4))) OR
   (CREDENTL='CH ' & SPECS2=5) OR
   (CREDENTL='DPM' & SPECS2=6) OR
   (CREDENTL='OD ' & SPECS2=7) THEN HLCF2='K';
ELSE IF HCREDNTL^='F' OR (HSPEC2 NOT IN ('F','S','U')) THEN HLCF2='N';
ELSE HLCF2='I';
RUN;

PROC FREQ ORDER=FREQ; TABLES HLCF1 HLCF2;
 TITLE1 '**** SETTING ****';
 TITLE2 '**** LOG. CONSISTENCY: PROVIDER CREDENTIALS & SPECIALTY CODE ****';
```

LOGICAL CONSISTENCY: PHYSICIAN STATUS and SPECIALTY CODE

An example of an inconsistency is when physician status has a value of 2 and the specialty code indicates an osteopathic specialty.

Physician status (PS):

a. PS has two acceptable values: 1 or 2

b. PS flag (PSF) has one acceptable value: F

Specialty code flag (SPF) has 3 acceptable values: F, S, or U

Specialty code needs to be re-coded as SPECS (see Exhibit 3-1). Logically consistent values of PS and SPECS are shown in Exhibit 3-3.

Notes:

(1) A value of 10 was assigned for SPECS to catch any erroneous specialty code that was not picked by the variable integrity screens.

(2) Because the secondary specialty code is not a required data element, it may be desirable to exclude from the comparisons cases in which the secondary specialty code is equal to zero (missing) or assign a blank value to the flag variable.

(3) For the purposes of the logical consistency tests, code S is acceptable but it is actually an obsolete code that should be replaced (see the notes to the specifications for specialty code in Chapter 2).

(4) For the purposes of the logical consistency tests, the retired osteopathy codes are included in code F. The flowchart does not make reference to such instances but the accompanying SAS program includes the appropriate coding.

(5) The data format for specialty code is different for the carrier record and the Registry file (see Chapter 1). Since the Registry version is alphanumeric, the accompanying SAS program includes some logic to recode blank fields as missing values and to recode the value 'b0' as zero (the lower case b indicates a blank).

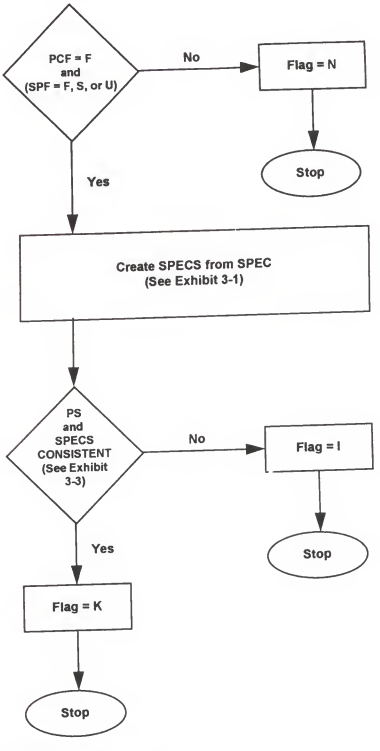
If an inconsistency is found, check the values of provider credentials and the school code as well as physician status and specialty code.

EXHIBIT 3-3

LOGICALLY CONSISTENT VALUES OF PHYSICIAN STATUS (PS) AND SPECS

PS	SPECS
1	1, 2, 8, or 9
2	3, 4, 5, 6, or 7

FLOWCHART FOR LOGICAL CONSISTENCY BETWEEN PHYSICIAN STATUS AND SPECIALTY CODE



Notes:

PS denotes physician status
PSF denotes physician status flag
SPEC denotes specialty code
SPF denotes specialty code flag

```
 /*********************************************************/
 /*                                                       */
 /*   Check consistency between physician status &        */
 /*                             specialty codes           */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
      (KEEP=SPEC1 SPEC2 PHYSSTAT);

 /* LOGICAL CONSISTENCY:                                  */
 /* PHYSICIAN STATUS (PHYSSTAT) & SPECIALTY CODE (SPEC1,SPEC2) */

 IF PHYSSTAT IN ('1','2') THEN HPHYSTAT='F';
 ELSE IF PHYSSTAT IN ('0',' ') THEN HPHYSTAT='M';
 ELSE HPHYSTAT='E';

 IF ('01'<=SPEC1<='41') OR (SPEC1 IN ('44','46','48','66','70')) OR
    ('76'<=SPEC1<='79') OR ('81'<=SPEC1<='86') OR ('90'<=SPEC1<='94')
    THEN HSPEC1='F';
 ELSE IF SPEC1 IN ('  ',' 0','00') THEN HSPEC1='M';
 ELSE IF SPEC1='99' THEN HSPEC1='U';
 ELSE IF SPEC1='49' THEN HSPEC1='S';
 ELSE HSPEC1='E';

 IF SPEC1='  ' THEN SPECS1=.;
 ELSE IF SPEC1=' 0' THEN SPECS1=0;
 ELSE IF SPEC1 IN
           ('01','02','03','04','05','06','07','08','10','11','13','14',
            '16','18','20','22','24','25','26','28','29','30','33',
            '34','36','37','38','39','40','44','46','66',
            '70','76','77','78','79','81','82','83','84','86','90',
            '91','92','93','94')
            THEN SPECS1=1;
 ELSE IF SPEC1 IN
           ('09','12','15','17','21','23','27','31','32') THEN SPECS1=2;
 ELSE IF SPEC1='19' THEN SPECS1=3;
 ELSE IF SPEC1='85' THEN SPECS1=4;
 ELSE IF SPEC1='35' THEN SPECS1=5;
 ELSE IF SPEC1='48' THEN SPECS1=6;
 ELSE IF SPEC1='41' THEN SPECS1=7;
 ELSE IF SPEC1='49' THEN SPECS1=8;
 ELSE IF SPEC1='99' THEN SPECS1=9;
 ELSE SPECS1=10;

 IF ('01'<=SPEC2<='41') OR (SPEC2 IN ('44','46','48','66','70')) OR
    ('76'<=SPEC2<='79') OR ('81'<=SPEC2<='86') OR ('90'<=SPEC2<='94')
    THEN HSPEC2='F';
 ELSE IF SPEC2 IN ('  ',' 0','00') THEN HSPEC2='M';
```

```
 ELSE IF SPEC2='99' THEN HSPEC2='U';
 ELSE IF SPEC2='49' THEN HSPEC2='S';
 ELSE HSPEC2='E';

 IF SPEC2='  ' THEN SPECS2=.;
 ELSE IF SPEC2=' 0' THEN SPECS2=0;
 ELSE IF SPEC2 IN
           ('01','02','03','04','05','06','07','08','10','11','13','14',
            '16','18','20','22','24','25','26','28','29','30','33',
            '34','36','37','38','39','40','44','46','66',
            '70','76','77','78','79','81','82','83','84','86','90',
            '91','92','93','94')
            THEN SPECS2=1;
 ELSE IF SPEC2 IN
           ('09','12','15','17','21','23','27','31','32') THEN SPECS2=2;
 ELSE IF SPEC2='19' THEN SPECS2=3;
 ELSE IF SPEC2='85' THEN SPECS2=4;
 ELSE IF SPEC2='35' THEN SPECS2=5;
 ELSE IF SPEC2='48' THEN SPECS2=6;
 ELSE IF SPEC2='41' THEN SPECS2=7;
 ELSE IF SPEC2='49' THEN SPECS2=8;
 ELSE IF SPEC2='99' THEN SPECS2=9;
 ELSE SPECS2=10;

 IF (PHYSSTAT='1' & (SPECS1 IN (1,2,8,9))) OR
    (PHYSSTAT='2' & (SPECS1 IN (3,4,5,6,7))) THEN HLCF1='K';
 ELSE IF HPHYSTAT^='F' OR (HSPEC1 NOT IN ('F','S','U')) THEN HLCF1='N';
 ELSE HLCF1='I';

 IF (PHYSSTAT='1' & (SPECS2 IN (1,2,8,9))) OR
    (PHYSSTAT='2' & (SPECS2 IN (3,4,5,6,7))) THEN HLCF2='K';
 ELSE IF HPHYSTAT^='F' OR (HSPEC2 NOT IN ('F','S','U')) THEN HLCF2='N';
 ELSE HLCF2='I';
RUN;

PROC FREQ ORDER=FREQ; TABLES HLCF1 HLCF2;
 TITLE1 '**** SETTING ****';
 TITLE2 '**** LOGICAL CONSISTENCY: PHYSICIAN STATUS & SPECIALTY CODE ****';
RUN;
```

LOGICAL CONSISTENCY: PROVIDER CREDENTIALS and SCHOOL CODE

An example of an inconsistency is when provider credentials indicate a physician and the school type indicates that the provider graduated from a podiatric school.

Provider credentials (PC):

a. PC has seven acceptable values: MD, DO, DDM, DDS, CH, DPM, OD

b. PC flag (PCF) has one acceptable value: F

School code flag (SF) has two acceptable values: F or R

For school codes with SF = F, the school codes can be collapsed (MSCHTYPE) as indicated in Exhibit 3-4. Because of their values, osteopathic school codes should be recoded before the medical school codes. Similarly, depending on your computer system's collating sequence, podiatric school codes may need to be recoded before the medical school codes.

Logically consistent values of PC and school recode (MSCHTYPE) are found in Exhibit 3-5.

If an inconsistency is found, check the values of physician status and specialty code as well as provider credentials and the school code.

EXHIBIT 3-4

SCHOOL RECODES

MSCHTYPE	School Type	School Codes
1	Medical	< 10000
2	Dental	10000-29999
3	Podiatry	30000-39999, 000XA, 000XB, 000XC, 000XD, 000XE, 000XF, 000XG, 000XH, 000XI, 000XJ, 000XK
4	Optometrist	40000-49999
5	Chiropractic	50000-59999
6	Foreign	99999
7	Osteopathic	00576, 01175, 01675, 01875, 02275, 02576, 02878, 02879, 03375, 03575, 03875, 03979, 04177, 04878, 05575
8	bad code	any other code

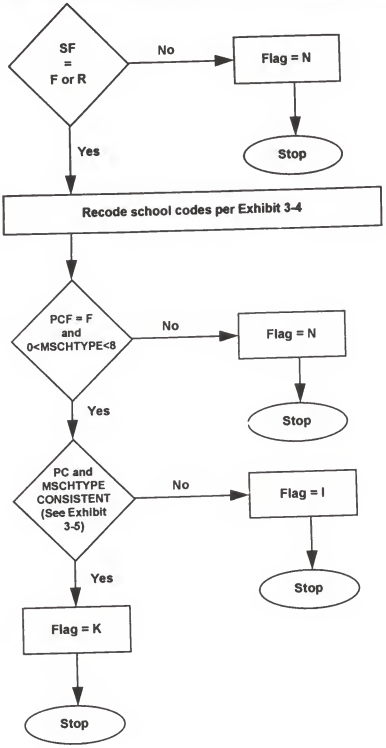
Note: The ranges are used to indicate listed codes (Exhibit 2-1) within the range. Therefore, school code integrity checks need to be performed before these recodes are utilized.

EXHIBIT 3-5

LOGICALLY CONSISTENT VALUES OF PROVIDER CREDENTIALS AND SCHOOL RECODE (MSCHTYPE)

MSCHTYPE	PC
1	MD
2	DDM or DDS
3	DPM
4	OD
5	CH
6	MD, DDM, DDS, CH, or OD
7	DO

FLOWCHART FOR THE LOGICAL CONSISTENCY BETWEEN PROVIDER CREDENTIALS AND SCHOOL TYPE



Notes:

SF denotes school flag
PC denotes provider credentials
PCF denotes provider credentials flag

```
 /*************************************************************/
 /*                                                           */
 /*  Check logical consistency between provider credentials   */
 /*                                & school type              */
 /*                                                           */
 /*************************************************************/

DATA S;
 SET IN.JUL0293
      (KEEP=SETMDSCH CREDENTL);

 /* LOGICAL CONSISTENCY:                                      */
 /* PROVIDER CREDENTIALS (CREDENTL) & SCHOOL CODE (SETMDSCH) */

 IF CREDENTL IN ('MD ','DO ','DDM','DDS','DPM','CH ','OD ') THEN HCREDNTL='F';
 ELSE IF CREDENTL='   ' THEN HCREDNTL='M';
 ELSE HCREDNTL='E';

 IF SETMDSCH IN ('00102','00104','00106','00301','00401','00402',
                 '00501','00502','00504','00505','00506','00507',
                 '00508','00509','00511','00512','00513','00514',
                 '00515','00516','00517','00518','00519','00576',
                 '00702','00705','00801','00802','01001','01002',
                 '01003','01102','01103','01104','01175','01201',
                 '01205','01209','01211','01212','01218','01219',
                 '01221','01222','01401','01601','01602','01604',
                 '01605','01606','01608','01609','01610','01611',
                 '01613','01614','01615','01616','01617','01618',
                 '01619','01622','01623','01642','01643','01644',
                 '01645','01675','01705','01708','01709','01717',
                 '01718','01720','01801','01803','01804','01806',
                 '01808','01810','01875','01902','01903','01904',
                 '01907','02001','02002','02004','02005','02007',
                 '02008','02009','02011','02012','02101','02104',
                 '02105','02106','02201','02275','02301','02303',
                 '02304','02305','02306','02307','02308','02309',
                 '02311','02312','02401','02405','02406','02407',
                 '02415','02416','02501','02505','02507','02508',
                 '02512','02576','02604','02605','02607','02608',
                 '02701','02702','02801','02802','02803','02805',
                 '02807','02808','02810','02820','02822','02826',
                 '02828','02830','02833','02834','02835','02843',
                 '02844','02845','02846','02878','02879','03004',
                 '03005','03006','03007','03101','03201','03305',
                 '03306','03375','03401','03501','03503','03506',
                 '03508','03509','03510','03511','03513','03515',
                 '03519','03520','03543','03545','03546','03547',
                 '03548','03575','03601','03603','03604','03605',
                 '03607','03608','03701','03801','03802','03803',
                 '03806','03808','03809','03811','03819','03823',
```

```
                '03825','03826','03840','03841','03843','03844',
                '03845','03875','03901','03905','03979','04001',
                '04002','04101','04102','04107','04109','04111',
                '04112','04113','04114','04177','04201','04202',
                '04203','04204','04301','04501','04504','04601',
                '04701','04705','04706','04707','04708','04709',
                '04710','04711','04713','04714','04715','04720',
                '04802','04803','04804','04805','04806','04807',
                '04812','04813','04814','04815','04816','04878',
                '04901','05002','05101','05104','05106','05107',
                '05404','05415','05501','05502','05575','05602',
                '05603','05605','05606','000XF','000XG',
                '000XH','000XI','30000','30100','30200','30300',
                '30400','30500','30600','40000','40010','40020',
                '40030','40040','40050','40060','40070','40080',
                '40090','40100','40110','40120','40130','40140',
                '40150','04160','40170','50000','50010','50020',
                '50030','50040','50050','50060','50065','50070',
                '50080','50090','50100','50110','50120','50130',
                '50140','50150','50160','50170','50180','50190',
                '50200','50210','50220','50230','50240','50250',
                '50260','50270','50280','50290','50300','50310',
                '99999','10000','20000')
               THEN HMEDSCHS='F';
 ELSE IF SETMDSCH^=RIGHT(SETMDSCH) THEN HMEDSCHS='J';
 ELSE IF SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                      '000XJ','000XK') THEN HMEDSCHS='R';
 ELSE IF SETMDSCH='     ' THEN HMEDSCHS='M';
 ELSE HMEDSCHS='E';
IF HMEDSCHS IN ('F','R') THEN DO;
  IF SETMDSCH IN ('00576','01175','01675','01875','02275','02576',
                  '02878','02879','03375','03575','03875','03979'
                  '04177','04878','05575') THEN MSCHTYPE=7;
  ELSE IF ('30000'<=SETMDSCH<='39999') ]
         (SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                       '000XF','000XG','000XH','000XI','000XJ','000XK'))
                       THEN MSCHTYPE=3;
  ELSE IF SETMDSCH<'10000' THEN MSCHTYPE=1;
  ELSE IF '10000'<=SETMDSCH<='29999' THEN MSCHTYPE=2;
  ELSE IF '40000'<=SETMDSCH<='49999' THEN MSCHTYPE=4;
  ELSE IF '50000'<=SETMDSCH<='59999' THEN MSCHTYPE=5;
  ELSE IF SETMDSCH='99999' THEN MSCHTYPE=6;
  ELSE MSCHTYPE=8;
END;
 IF (MSCHTYPE=1 & CREDENTL='MD ') OR
    (MSCHTYPE=2 & (CREDENTL IN ('DDM','DDS'))) OR
    (MSCHTYPE=3 & CREDENTL='DPM') OR
    (MSCHTYPE=4 & CREDENTL='OD ') OR
    (MSCHTYPE=5 & CREDENTL='CH ') OR
    (MSCHTYPE=6 & (CREDENTL IN ('MD ','DDM', 'DDS', 'CH ','OD '))) OR
```

```
    (MSCHTYPE=7 & CREDENTL='DO ') THEN HLCFS='K';
  ELSE IF (HMEDSCHS NOT IN ('F','R')) OR HCREDNTL^='F' THEN HLCFS='N';
  ELSE HLCFS='I';
RUN;
PROC FREQ ORDER=FREQ; TABLES HLCFS;
 TITLE1 '**** SETTING ****';
 TITLE2 '**** LOGICAL CONSISTENCY: PROVIDER CREDENTIALS & SCHOOL CODE ****';
RUN;
```

LOGICAL CONSISTENCY: PHYSICIAN STATUS and SCHOOL CODE

An example of an inconsistency is when physician status indicates a physician and the school code indicates the provider graduated from a chiropractic school.

Physician status (PS):

a. PS has two acceptable values: 1 or 2

b. PS flag (PSF) has one acceptable value: F

School code flag (SF) has two acceptable values: F or R

For school codes with SF = F, the school codes can be collapsed (MSCHTYPE) as indicated in Exhibit 3-4. Because of their values, osteopathic school codes should be recoded before the medical school codes. Similarly, depending on your system's collating sequence, podiatric school codes may need to be recoded before the medical school codes.

Logically consistent values of PS and school recode (MSCHTYPE) are in Exhibit 3-6.

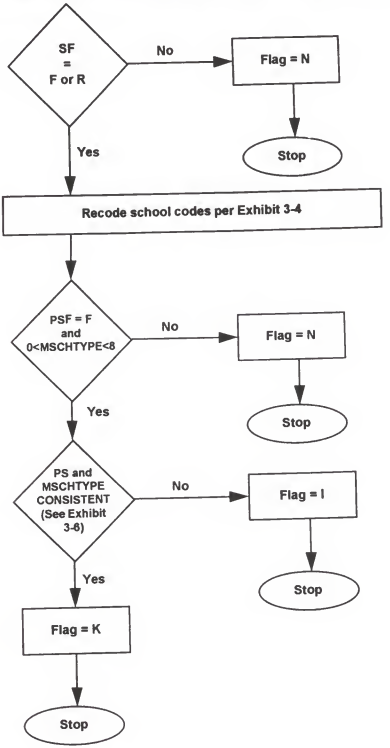
If an inconsistency is found, check the values of provider credentials and specialty code as well as physician status and the school code.

EXHIBIT 3-6

LOGICALLY CONSISTENT VALUES OF PHYSICIAN STATUS (PS) AND SCHOOL RECODE (MSCHTYPE)

MSCHTYPE	PS
1	1
2	2
3	2
4	2
5	2
6	1 or 2
7	1

FLOWCHART FOR THE LOGICAL CONSISTENCY BETWEEN PHYSICIAN STATUS AND SCHOOL CODE



Notes:

SF denotes school flag
PS denotes physician status
PSF denotes physician status flag

```
 /*********************************************************/
 /*                                                       */
 /*  Check logical consistency between physician status   */
 /*                                & school codes         */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
      (KEEP=SETMDSCH PHYSSTAT);

 /* LOGICAL CONSISTENCY:                                  */
 /* PHYSICIAN STATUS (PHYSSTAT) & SCHOOL CODE (SETMDSCH) */

 IF PHYSSTAT IN ('1','2') THEN HPHYSTAT='F';
 ELSE IF PHYSSTAT IN ('0',' ') THEN HPHYSTAT='M';
 ELSE HPHYSTAT='E';

 IF SETMDSCH IN ('00102','00104','00106','00301','00401','00402',
                 '00501','00502','00504','00505','00506','00507',
                 '00508','00509','00511','00512','00513','00514',
                 '00515','00516','00517','00518','00519','00576',
                 '00702','00705','00801','00802','01001','01002',
                 '01003','01102','01103','01104','01175','01201',
                 '01205','01209','01211','01212','01218','01219',
                 '01221','01222','01401','01601','01602','01604',
                 '01605','01606','01608','01609','01610','01611',
                 '01613','01614','01615','01616','01617','01618',
                 '01619','01622','01623','01642','01643','01644',
                 '01645','01675','01705','01708','01709','01717',
                 '01718','01720','01801','01803','01804','01806',
                 '01808','01810','01875','01902','01903','01904',
                 '01907','02001','02002','02004','02005','02007',
                 '02008','02009','02011','02012','02101','02104',
                 '02105','02106','02201','02275','02301','02303',
                 '02304','02305','02306','02307','02308','02309',
                 '02311','02312','02401','02405','02406','02407',
                 '02415','02416','02501','02505','02507','02508',
                 '02512','02576','02604','02605','02607','02608',
                 '02701','02702','02801','02802','02803','02805',
                 '02807','02808','02810','02820','02822','02826',
                 '02828','02830','02833','02834','02835','02843',
                 '02844','02845','02846','02878','02879','03004',
                 '03005','03006','03007','03101','03201','03305',
                 '03306','03375','03401','03501','03503','03506',
                 '03508','03509','03510','03511','03513','03515',
                 '03519','03520','03543','03545','03546','03547',
                 '03548','03575','03601','03603','03604','03605',
                 '03607','03608','03701','03801','03802','03803',
                 '03806','03808','03809','03811','03819','03823',
```

```
              '03825','03826','03840','03841','03843','03844',
              '03845','03875','03901','03905','03979','04001',
              '04002','04101','04102','04107','04109','04111',
              '04112','04113','04114','04177','04201','04202',
              '04203','04204','04301','04501','04504','04601',
              '04701','04705','04706','04707','04708','04709',
              '04710','04711','04713','04714','04715','04720',
              '04802','04803','04804','04805','04806','04807',
              '04812','04813','04814','04815','04816','04878',
              '04901','05002','05101','05104','05106','05107',
              '05404','05415','05501','05502','05575','05602',
              '05603','05605','05606','000XF','000XG',
              '000XH','000XI','30000','30100','30200','30300',
              '30400','30500','30600','40000','40010','40020',
              '40030','40040','40050','40060','40070','40080',
              '40090','40100','40110','40120','40130','40140',
              '40150','04160','40170','50000','50010','50020',
              '50030','50040','50050','50060','50065','50070',
              '50080','50090','50100','50110','50120','50130',
              '50140','50150','50160','50170','50180','50190',
              '50200','50210','50220','50230','50240','50250',
              '50260','50270','50280','50290','50300','50310',
              '99999','10000','20000')
              THEN HMEDSCHS='F';
 ELSE IF SETMDSCH^=RIGHT(SETMDSCH) THEN HMEDSCHS='J';
 ELSE IF SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                      '000XJ','000XK') THEN HMEDSCHS='R';
 ELSE IF SETMDSCH='     ' THEN HMEDSCHS='M';
 ELSE HMEDSCHS='E';

IF HMEDSCHS IN ('F','R') THEN DO;
  IF SETMDSCH IN ('00576','01175','01675','01875','02275','02576',
                  '02878','02879','03375','03575','03875','03979'
                  '04177','04878','05575') THEN MSCHTYPE=7;
  ELSE IF ('30000'<=SETMDSCH<='39999') ]
         (SETMDSCH IN ('000XA','000XB','u00XC','000XD','000XE',
                       '000XF','000XG','000XH','000XI','000XJ','000XK'))
                       THEN MSCHTYPE=3;
  ELSE IF SETMDSCH<'10000' THEN MSCHTYPE=1;
  ELSE IF '10000'<=SETMDSCH<='29999' THEN MSCHTYPE=2;
  ELSE IF '40000'<=SETMDSCH<='49999' THEN MSCHTYPE=4;
  ELSE IF '50000'<=SETMDSCH<='59999' THEN MSCHTYPE=5;
  ELSE IF SETMDSCH='99999' THEN MSCHTYPE=6;
  ELSE MSCHTYPE=8;
END;

 IF ((MSCHTYPE IN (1,6,7)) & PHYSSTAT='1') OR
    ((MSCHTYPE IN (2,3,4,5,6)) & PHYSSTAT='2') THEN HLCFS='K';
 ELSE IF (HMEDSCHS NOT IN ('F','R')) OR HPHYSTAT^='F' THEN HLCFS='N';
 ELSE HLCFS='I';
```

```
RUN;

PROC FREQ ORDER=FREQ; TABLES HLCFS;
 TITLE1 '**** SETTING ****';
 TITLE2 '**** LOGICAL CONSISTENCY: PHYSICIAN STATUS & SCHOOL CODE ****';
RUN;
```

LOGICAL CONSISTENCY: SPECIALTY CODE and SCHOOL CODE

An example of an inconsistency is when the specialty code indicates a chiropractor but the school code indicates the provider graduated from a school of optometry.

Specialty code flag (SPF) has three acceptable values: F, S, or U. School code flag (SF) has two acceptable values: F or R.

Specialty code needs to be re-coded as SPECS (see Exhibit 3-1)

For school codes with SF = F, the school codes can be collapsed (MSCHTYPE) as indicated in Exhibit 3-4. Because of their values, osteopathic school codes should be recoded before the medical school codes. Similarly, depending on your system's collating sequence, podiatric school codes may need to be recoded before the medical school codes.

Logically consistent values of SPECS and school recode (MSCHTYPE) are shown in Exhibit 3-7.

Note:

(1) Because the secondary specialty code is not a required data element, it may be desirable to exclude from the comparisons cases in which the secondary specialty code is equal to zero (missing) or assign a blank value to the flag variable.

(2) For the purposes of the logical consistency tests, code *S* is acceptable but it is actually an obsolete code that should be replaced (see the notes to the specifications for specialty code in Chapter 2).

(3) For the purposes of the logical consistency tests, the retired osteopathy codes are included in code F. The flowchart does not make reference to such instances but the accompanying SAS program includes the appropriate coding.

(4) The data format for specialty code is different for the carrier record and the Registry file (see Chapter 1). Since the Registry version is alphanumeric, the accompanying SAS program includes some logic to recode blank fields as missing values and to recode the value 'b0' as zero (the lower case b indicates a blank).

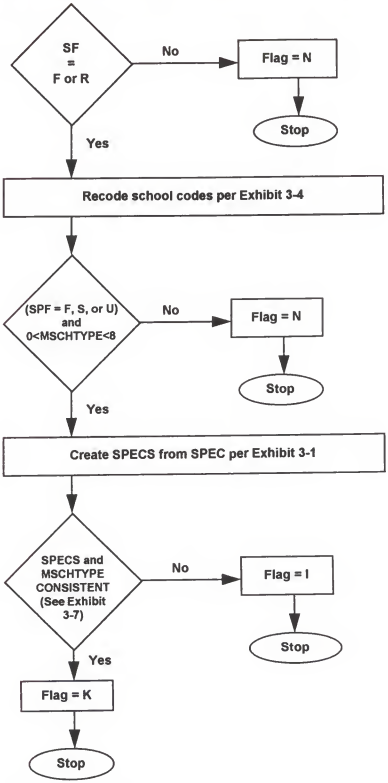
If an inconsistency is found, check the values of physician status and provider credentials as well as specialty code and the school code.

EXHIBIT 3-7

LOGICALLY CONSISTENT VALUES OF SPECIALTY RECODE (SPECS) AND SCHOOL RECODE (MSCHTYPE)

MSCHTYPE	SPECS
1	1, 8, or 9
2	3 or 4
3	6
4	7
5	5
6	1, 3, 4, 5, 7, 8, or 9
7	1, 2, 8, or 9

FLOWCHART FOR THE LOGICAL CONSISTENCY BETWEEN SPECIALTY CODE AND SCHOOL TYPE



Notes:

SF denotes school flag
SPF denotes specialty code flag
SPEC denotes specialty code

```
 /*********************************************************/
 /*                                                       */
 /*  Check logical consistency between school type &      */
 /*                                    specialty codes    */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=SETMDSCH SPEC1 SPEC2);

 /* LOGICAL CONSISTENCY:                                  */
 /* SPECIALTY CODE (SPEC1,SPEC2) & SCHOOL CODE (SETMDSCH) */

 IF ('01'<=SPEC1<='41') OR (SPEC1 IN ('44','46','48','66','70')) OR
    ('76'<=SPEC1<='79') OR ('81'<=SPEC1<='86') OR ('90'<=SPEC1<='94')
    THEN HSPEC1='F';
 ELSE IF SPEC1 IN ('  ',' 0','00') THEN HSPEC1='M';
 ELSE IF SPEC1='99' THEN HSPEC1='U';
 ELSE IF SPEC1='49' THEN HSPEC1='S';
 ELSE HSPEC1='E';

 IF SPEC1='  ' THEN SPECS1=.;
 ELSE IF SPEC1=' 0' THEN SPECS1=0;
 ELSE IF SPEC1 IN
          ('01','02','03','04','05','06','07','08','10','11','13','14',
           '16','18','20','22','24','25','26','28','29','30','33',
           '34','36','37','38','39','40','44','46','66',
           '70','76','77','78','79','81','82','83','84','86','90',
           '91','92','93','94')
           THEN SPECS1=1;
 ELSE IF SPEC1 IN
          ('09','12','15','17','21','23','27','31','32') THEN SPECS1=2;
 ELSE IF SPEC1='19' THEN SPECS1=3;
 ELSE IF SPEC1='85' THEN SPECS1=4;
 ELSE IF SPEC1='35' THEN SPECS1=5;
 ELSE IF SPEC1='48' THEN SPECS1=6;
 ELSE IF SPEC1='41' THEN SPECS1=7;
 ELSE IF SPEC1='49' THEN SPECS1=8;
 ELSE IF SPEC1='99' THEN SPECS1=9;
 ELSE SPECS1=10;

 IF ('01'<=SPEC2<='41') OR (SPEC2 IN ('44','46','48','66','70')) OR
    ('76'<=SPEC2<='79') OR ('81'<=SPEC2<='86') OR ('90'<=SPEC2<='94')
    THEN HSPEC2='F';
 ELSE IF SPEC2 IN ('  ',' 0','00') THEN HSPEC2='M';
 ELSE IF SPEC2='99' THEN HSPEC2='U';
 ELSE IF SPEC2='49' THEN HSPEC2='S';
 ELSE HSPEC2='E';
```

```
IF SPEC2='  ' THEN SPECS2=.;
ELSE IF SPEC2=' 0' THEN SPECS2=0;
ELSE IF SPEC2 IN
          ('01','02','03','04','05','06','07','08','10','11','13','14',
           '16','18','20','22','24','25','26','28','29','30','33',
           '34','36','37','38','39','40','44','46','66',
           '70','76','77','78','79','81','82','83','84','86','90',
           '91','92','93','94')
           THEN SPECS2=1;
ELSE IF SPEC2 IN
          ('09','12','15','17','21','23','27','31','32') THEN SPECS2=2;
ELSE IF SPEC2='19' THEN SPECS2=3;
ELSE IF SPEC2='85' THEN SPECS2=4;
ELSE IF SPEC2='35' THEN SPECS2=5;
ELSE IF SPEC2='48' THEN SPECS2=6;
ELSE IF SPEC2='41' THEN SPECS2=7;
ELSE IF SPEC2='49' THEN SPECS2=8;
ELSE IF SPEC2='99' THEN SPECS2=9;
ELSE SPECS2=10;

IF SETMDSCH IN ('00102','00104','00106','00301','00401','00402',
                '00501','00502','00504','00505','00506','00507',
                '00508','00509','00511','00512','00513','00514',
                '00515','00516','00517','00518','00519','00576',
                '00702','00705','00801','00802','01001','01002',
                '01003','01102','01103','01104','01175','01201',
                '01205','01209','01211','01212','01218','01219',
                '01221','01222','01401','01601','01602','01604',
                '01605','01606','01608 ','01609','01610','01611',
                '01613','01614','01615','01616','01617','01618',
                '01619','01622','01623','01642','01643','01644',
                '01645','01675','01705','01708','01709','01717',
                '01718','01720','01801','01803','01804','01806',
                '01808','01810','01875','01902','01903','01904',
                '01907','02001','02002','02004','02005','02007',
                '02008','02009','02011','02012','02101','02104',
                '02105','02106','02201','02275','02301','02303',
                '02304','02305','02306','02307','02308','02309',
                '02311','02312','02401','02405','02406','02407',
                '02415','02416','02501','02505','02507','02508',
                '02512','02576','02604','02605','02607','02608',
                '02701','02702','02801','02802','02803','02805',
                '02807','02808','02810','02820','02822','02826',
                '02828','02830','02833','02834','02835','02843',
                '02844','02845','02846','02878','02879','03004',
                '03005','03006','03007','03101','03201','03305',
                '03306','03375','03401','03501','03503','03506',
                '03508','03509','03510','03511','03513','03515',
                '03519','03520','03543','03545','03546','03547',
                '03548','03575','03601','03603','03604','03605',
```

```
              '03607','03608','03701','03801','03802','03803',
              '03806','03808','03809','03811','03819','03823',
              '03825','03826','03840','03841','03843','03844',
              '03845','03875','03901','03905','03979','04001',
              '04002','04101','04102','04107','04109','04111',
              '04112','04113','04114','04177','04201','04202',
              '04203','04204','04301','04501','04504','04601',
              '04701','04705','04706','04707','04708','04709',
              '04710','04711','04713','04714','04715','04720',
              '04802','04803','04804','04805','04806','04807',
              '04812','04813','04814','04815','04816','04878',
              '04901','05002','05101','05104','05106','05107',
              '05404','05415','05501','05502','05575','05602',
              '05603','05605','05606','000XF','000XG',
              '000XH','000XI','30000','30100','30200','30300',
              '30400','30500','30600','40000','40010','40020',
              '40030','40040','40050','40060','40070','40080',
              '40090','40100','40110','40120','40130','40140',
              '40150','04160','40170','50000','50010','50020',
              '50030','50040','50050','50060','50065','50070',
              '50080','50090','50100','50110','50120','50130',
              '50140','50150','50160','50170','50180','50190',
              '50200','50210','50220','50230','50240','50250',
              '50260','50270','50280','50290','50300','50310',
              '99999','10000','20000')
              THEN HMEDSCHS='F';
 ELSE IF SETMDSCH^=RIGHT(SETMDSCH) THEN HMEDSCHS='J';
 ELSE IF SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                      '000XJ','000XK') THEN HMEDSCHS='R';
 ELSE IF SETMDSCH='     ' THEN HMEDSCHS='M';
 ELSE HMEDSCHS='E';

IF HMEDSCHS IN ('F','R') THEN DO;
  IF SETMDSCH IN ('00576','01175','01675','01875','02275','02576',
                  '02878','02879','03375','03575','03875','03979'
                  '04177','04878','05575') THEN MSCHTYPE=7;
  ELSE IF ('30000'<=SETMDSCH<='39999') ]
         (SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                       '000XF','000XG','000XH','000XI','000XJ','000XK'))
                       THEN MSCHTYPE=3;
  ELSE IF SETMDSCH<'10000' THEN MSCHTYPE=1;
  ELSE IF '10000'<=SETMDSCH<='29999' THEN MSCHTYPE=2;
  ELSE IF '40000'<=SETMDSCH<='49999' THEN MSCHTYPE=4;
  ELSE IF '50000'<=SETMDSCH<='59999' THEN MSCHTYPE=5;
  ELSE IF SETMDSCH='99999' THEN MSCHTYPE=6;
  ELSE MSCHTYPE=8;
END;

 IF (MSCHTYPE=1 & (SPECS1 IN (1,8,9))) OR
    (MSCHTYPE=2 & (SPECS1 IN (3,4))) OR
```

```
    (MSCHTYPE=3 & SPECS1=6) OR
    (MSCHTYPE=4 & SPECS1=7) OR
    (MSCHTYPE=5 & SPECS1=5) OR
    (MSCHTYPE=6 & (SPECS1 IN (1,3,4,5,7,8,9))) OR
    (MSCHTYPE=7 & (SPECS1 IN (1,2,8,9))) THEN HLCFS1='K';
  ELSE IF (HMEDSCHS NOT IN ('F','R')) OR (HSPEC1 NOT IN ('F','S','U'))
   THEN HLCFS1='N';
  ELSE HLCFS1='I';

  IF (MSCHTYPE=1 & (SPECS2 IN (1,8,9))) OR
    (MSCHTYPE=2 & (SPECS2 IN (3,4))) OR
    (MSCHTYPE=3 & SPECS2=6) OR
    (MSCHTYPE=4 & SPECS2=7) OR
    (MSCHTYPE=5 & SPECS2=5) OR
    (MSCHTYPE=6 & (SPECS2 IN (1,3,4,5,7,8,9))) OR
    (MSCHTYPE=7 & (SPECS2 IN (1,2,8,9))) THEN HLCFS2='K';
  ELSE IF (HMEDSCHS NOT IN ('F','R')) OR (HSPEC2 NOT IN ('F','S','U'))
   THEN HLCFS2='N';
  ELSE HLCFS2='I';
RUN;

PROC FREQ ORDER=FREQ; TABLES HLCFS1 HLCFS2;
 TITLE1 '**** SETTING ****';
 TITLE2 '**** LOGICAL CONSISTENCY: SPECIALTY CODE & SCHOOL CODE ****';
RUN;
```

LOGICAL CONSISTENCY: BIRTH YEAR AND GRADUATION YEAR

An example of an inconsistency is when the graduation year and birth year imply a very young graduation age (e.g., 15 years old) or very old graduation age (e.g., 65 years old).

The birth year flag (BYF) has two acceptable values: F or D. The graduation year flag (GYF) has two acceptable values: F or D.

Graduation age (GRADAGE) is equal to graduation year minus birth year.

Birth year and graduation year are consistent when:

$$24 \leq \text{GRADAGE} \leq 40$$

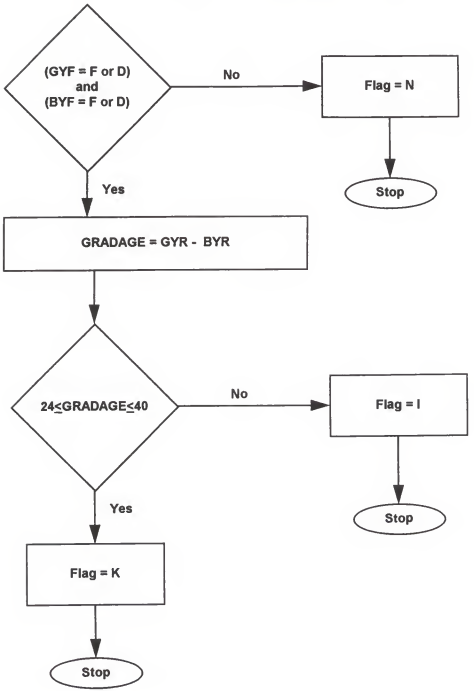
Notes:

(1) The data integrity tests for birth year are included in the SAS program but not the flowchart.

(2) The birth year data integrity tests are similar to those for the full date of birth except that for years 1901-1969, month and day values are not checked (however, January 1, 1901 is still not an acceptable value).

If an inconsistency is found, check the provider's date of birth and graduation date.

FLOWCHART FOR LOGICAL CONSISTENCY BETWEEN BIRTH YEAR AND GRADUATION YEAR



Notes:

BYR denotes birth year;
BYF denotes birth year flag;
GYR denotes graduation year;
GYF denotes graduation year flag;
GRADAGE denotes graduation age.

```
 /*********************************************************/
 /*                                                       */
 /*  Check logical consistency between birth year and     */
 /*                                  graduation year      */
 /*                                                       */
 /*********************************************************/

DATA S;
 SET IN.JUL0293
       (KEEP=SETDOB SETGRDYR);

 /* SETTING DATE OF BIRTH (SETDOB) */

 IF SETDOB>0 THEN DO;
  DOBYRS = SUBSTR(SETDOB,7,2);
  MODAYS = SUBSTR(SETDOB,9,4);
  IF DOBYRS='  ' THEN DO;
   IF (101<=SETDOB<=131) ] (201<=SETDOB<=229) ]
      (301<=SETDOB<=331) ] (401<=SETDOB<=430) ]
      (501<=SETDOB<=531) ] (601<=SETDOB<=630) ]
      (701<=SETDOB<=731) ] (801<=SETDOB<=831) ]
      (901<=SETDOB<=930) ] (1001<=SETDOB<=1031) ]
      (1101<=SETDOB<=1130) ] (1201<=SETDOB<=1231)
      THEN DOBYRS='00';
   END;
 END;

 IF ('14'<=DOBYRS<='69') THEN HDOBS='F';

 ELSE IF DOBYRS='00' & MODAYS^='0000' &
 ((' 101'<=MODAYS<='0131') ] (' 201'<=MODAYS<='0228') ]
  (MODAYS='0229' & DOBYRS^='00' &  (DOBYRS/4=INT(DOBYRS/4))) ]
  (' 301'<=MODAYS<='0331') ] (' 401'<=MODAYS<='0430') ]
  (' 501'<=MODAYS<='0531') ] (' 601'<=MODAYS<='0630') ]
  (' 701'<=MODAYS<='0731') ] (' 801'<=MODAYS<='0831') ]
  (' 901'<=MODAYS<='0930') ] ('1001'<=MODAYS<='1031') ]
  ('1101'<=MODAYS<='1130') ] ('1201'<=MODAYS<='1231')) THEN HDOBS='D';

 ELSE IF (' 1'<=DOBYRS<='13') THEN HDOBS='D';

 ELSE IF SETDOB=999999 ] SETDOB=0 ] SETDOB=. THEN HDOBS='M';

 ELSE IF SETDOB=10101 THEN HDOBS='1';

 ELSE IF DOBYRS='99' & MODAYS^='0000' &
 ((' 101'<=MODAYS<='0131') ] (' 201'<=MODAYS<='0228') ]
  (MODAYS='0229' & DOBYRS^='00' &  (DOBYRS/4=INT(DOBYRS/4))) ]
  (' 301'<=MODAYS<='0331') ] (' 401'<=MODAYS<='0430') ]
  (' 501'<=MODAYS<='0531') ] (' 601'<=MODAYS<='0630') ]
  (' 701'<=MODAYS<='0731') ] (' 801'<=MODAYS<='0831') ]
```

```
  (' 901'<=MODAYS<='0930') ] ('1001'<=MODAYS<='1031') ]
  ('1101'<=MODAYS<='1130') ] ('1201'<=MODAYS<='1231')) THEN HDOBS='D';

 ELSE HDOBS='E';

 /* SETTING GRADUATION YEAR (SETGRDYR) */

IF SETGRDYR=0 THEN HGRADYRS='M';
ELSE IF 30<=SETGRDYR<=39 THEN HGRADYRS='D';
ELSE IF 40<=SETGRDYR<=93 THEN HGRADYRS='F';
ELSE IF SETGRDYR=99 THEN HGRADYRS='9';
ELSE HGRADYRS='E';

IF HGRADYRS IN ('F','D') AND HDOBS IN ('F','D') THEN DO;
   GRADAGE = SETGRDYR - DOBYRS;
   IF (24<=GRADAGE<=40) THEN HLCFS='K';
   ELSE HLCFS='I';
END;
ELSE HLCFS='N';

OUTPUT S;
RUN;

PROC FREQ DATA=S ORDER=FREQ; TABLES HLCFS;
TITLE1 '**** SETTING ****';
TITLE2
 '**** LOGICAL CONSISTENCY: BIRTH YEAR & GRADUATION YEAR ****';
RUN;
```

LOGICAL CONSISTENCY: MEDICAL SCHOOL OPEN/CLOSE DATES and GRADUATION YEAR

We assume that program code has been created to identify medical schools (as distinct from other schools) where MSCHTYPE=1 denotes a medical school and that a graduation year flag (GYF) has been created (F and D are acceptable values for GYF).

Because open and close dates are not available for defunct non-medical schools, such schools are excluded from comparisons and the comparison flag variable takes a *blank* value.

Open and close dates for each school are in a separate file. (A flat file on diskette with school names and their codes and open/close dates can be obtained from BPO. Open/close dates are listed in Appendix A of this report.) Each open and close date includes the complete year value (i.e., 1856 instead of 56) to avoid century identification problems. Medical schools still in operation were given a pseudo closure date of 3000.

The carrier record graduation year has a YY format. Therefore, 1900 was added to its value in order to make it comparable to the open/closure dates. (This procedure would have to be modified after 1999.)

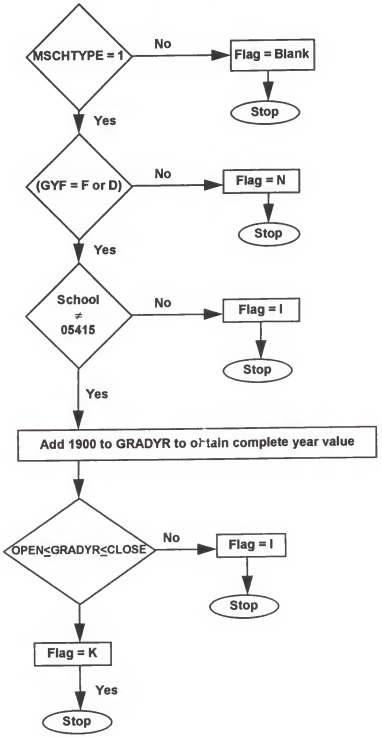
Open and/or closure dates could not be found for the Washington College of Physicians and Surgeons (code=05415) believed to have been located in Seattle, Washington. None of the contacted organizations and agencies ever heard of the school. Because open/closure dates are not available, the logical consistency flag will have a value of I (inconsistency between otherwise feasible values).

Logically consistent values for a given school code's open/close dates and graduation year:

Open date $\leq$ graduation year $\leq$ Close date

If an inconsistency is found, both school code and graduation date need to be checked.

FLOWCHART FOR LOGICAL CONSISTENCY BETWEEN GRADUATION YEAR AND MEDICAL SCHOOL OPEN/CLOSE DATES



Notes:

GYF denotes graduation year flag
SCHOOL denotes school code
GRADYR denotes graduation year
OPEN denotes school open date
CLOSE denotes school closure date

```
 /*********************************************************/
 /*                                                       */
 /* Check medical school open/close dates against         */
 /*              graduation dates on Registry file        */
 /*                                                       */
 /*********************************************************/

/* MEDICAL SCHOOL OPEN & CLOSE DATE FILE */

DATA M; INFILE IN2;
    INPUT MDSCH $5. OPENYR CLOSEYR;
RUN;
PROC SORT; BY MDSCH;
RUN;

/* LOGICAL CONSISTENCY:                                  */
/* MEDICAL SCHOOL OPEN/CLOSE DATES & GRADUATION */

DATA S(KEEP=SETMDSCH MSCHTYPS HMEDSCHS SETGRDYR HGRADYRS)
 SET IN1.JUL0293
      (KEEP=SETMDSCH SETGRDYR);

  IF SETMDSCH IN ('00102','00104','00106','00301','00401','00402',
                  '00501','00502','00504','00505','00506','00507',
                  '00508','00509','00511','00512','00513','00514',
                  '00515','00516','00517','00518','00519','00576',
                  '00702','00705','00801','00802','01001','01002',
                  '01003','01102','01103','01104','01175','01201',
                  '01205','01209','01211','01212','01218','01219',
                  '01221','01222','01401','01601','01602','01604',
                  '01605','01606','01608','01609','01610','01611',
                  '01613','01614','01615','01616','01617','01618',
                  '01619','01622','01623','01642','01643','01644',
                  '01645','01675','01705','01708','01709','01717',
                  '01718','01720','01801','01803','01804','01806',
                  '01808','01810','01875','01902','01903','01904',
                  '01907','02001','02002','02004','02005','02007',
                  '02008','02009','02011','02012','02101','02104',
                  '02105','02106','02201','02275','02301','02303',
                  '02304','02305','02306','02307','02308','02309',
                  '02311','02312','02401','02405','02406','02407',
                  '02415','02416','02501','02505','02507','02508',
                  '02512','02576','02604','02605','02607','02608',
                  '02701','02702','02801','02802','02803','02805',
                  '02807','02808','02810','02820','02822','02826',
                  '02828','02830','02833','02834','02835','02843',
                  '02844','02845','02846','02878','02879','03004',
                  '03005','03006','03007','03101','03201','03305',
                  '03306','03375','03401','03501','03503','03506',
                  '03508','03509','03510','03511','03513','03515',
```

```
                '03519','03520','03543','03545','03546','03547',
                '03548','03575','03601','03603','03604','03605',
                '03607','03608','03701','03801','03802','03803',
                '03806','03808','03809','03811','03819','03823',
                '03825','03826','03840','03841','03843','03844',
                '03845','03875','03901','03905','03979','04001',
                '04002','04101','04102','04107','04109','04111',
                '04112','04113','04114','04177','04201','04202',
                '04203','04204','04301','04501','04504','04601',
                '04701','04705','04706','04707','04708','04709',
                '04710','04711','04713','04714','04715','04720',
                '04802','04803','04804','04805','04806','04807',
                '04812','04813','04814','04815','04816','04873',
                '04901','05002','05101','05104','05106','05107',
                '05404','05415','05501','05502','05575','05602',
                '05603','05605','05606','000XF','000XG',
                '000XH','000XI','30000','30100','30200','30300',
                '30400','30500','30600','40000','40010','40020',
                '40030','40040','40050','40060','40070','40080',
                '40090','40100','40110','40120','40130','40140',
                '40150','04160','40170','50000','50010','50020',
                '50030','50040','50050','50060','50065','50070',
                '50080','50090','50100','50110','50120','50130',
                '50140','50150','50160','50170','50180','50190',
                '50200','50210','50220','50230','50240','50250',
                '50260','50270','50280','50290','50300','50310',
                '99999','10000','20000')
                THEN HMEDSCHS='F';
  ELSE IF SETMDSCH^=RIGHT(SETMDSCH) THEN HMEDSCHS='J';
  ELSE IF SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                       '000XJ','000XK') THEN HMEDSCHS='R';
  ELSE IF SETMDSCH='      ' THEN HMEDSCHS='M';
  ELSE HMEDSCHS='E';

IF HMEDSCHS IN ('F','R') THEN DO;
  IF SETMDSCH IN ('00576','01175','01675','01875','02275','02576',
                  '02878','02879','03375','03575','03875','03979'
                  '04177','04878','05575') THEN MSCHTYPS=7;
  ELSE IF ('30000'<=SETMDSCH<='39999') ]
          (SETMDSCH IN ('000XA','000XB','000XC','000XD','000XE',
                        '000XF','000XG','000XH','000XI','000XJ','000XK'))
                        THEN MSCHTYPS=3;
  ELSE IF SETMDSCH<'10000' THEN MSCHTYPS=1;
  ELSE IF '10000'<=SETMDSCH<='29999' THEN MSCHTYPS=2;
  ELSE IF '40000'<=SETMDSCH<='49999' THEN MSCHTYPS=4;
  ELSE IF '50000'<=SETMDSCH<='59999' THEN MSCHTYPS=5;
  ELSE IF SETMDSCH='99999' THEN MSCHTYPS=6;
  ELSE MSCHTYPS=8;
END;
```

```
  IF 40<=SETGRDYR<=93 THEN HGRADYRS='F';
  ELSE IF SETGRDYR^=RIGHT(SETGRDYR) THEN HGRADYRS='J';
  ELSE IF 30<=SETGRDYR<=39 THEN HGRADYRS='D';
  ELSE IF SETGRDYR IN (0,99,.) THEN HGRADYRS='M';
  ELSE HGRADYRS='E';

 OUTPUT S;
RUN;

PROC SORT DATA=S; BY SETMDSCH;
RUN;

DATA MS; MERGE M(RENAME=(MDSCH=SETMDSCH))
               S(WHERE=(MSCHTYPS=1) IN=INS);
         BY SETMDSCH;
         IF INS;

 GRADYRS = 1900 + SETGRDYR;

 IF SETMDSCH='05415' THEN HLCFS='I';
 ELSE IF (OPENYR<=GRADYRS<=CLOSEYR) & (HGRADYRS IN ('F', 'D')) THEN HLCFS='K';
 ELSE IF HGRADYRS NOT IN ('F','D') THEN HLCFS='N';
 ELSE HLCFS='I';
RUN;

PROC FREQ ORDER=FREQ; TABLES HLCFS;
TITLE1 '**** SETTING ****';
TITLE2
 '**** LOGICAL CONSISTENCY: MEDICAL SCHOOL OPEN/CLOSE DATES & GRADUATION
****';
```

CHAPTER 4

DETECTION OF MULTIPLE-UPIN PROVIDERS

MULTIPLE-UPIN PROVIDERS

Each provider is supposed to have only one UPIN. However, many instances of providers with more than one UPIN have been found. The purpose of this chapter is to detect *cases* of multiple-UPIN providers. (In this chapter, the word *cases* refers to sets of two or more UPINs identified by the detection algorithm.) Cases identified by the detection algorithm should be regarded as ***potential*** cases of multiple UPIN providers.

To verify that an identified case warrants further investigation, visual inspection, at a minimum, of the data elements present in each record in each case is needed. To help assess whether or not a computer-identified multiple-UPIN case warrants further investigation, it is recommended that the following data elements from the provider file be examined: state license number, state licensed in, credential, school code, graduation year, date of birth, the business address, the billing address, and all of the current name fields. The values of the identified providers should be compared. In many instances, a discrepancy in one pair of *feasible* values (c.f., Chapter 2) will suffice to indicate that the potential multiple-UPIN case is a *false positive* (that is, not really a multiple-UPIN case). There are instances, however, in which some of the available information for a case indicates that it is a false positive while other information indicates that further investigation is warranted. (See the example presented in section 8.2.1. of the *Carrier Analysis*.) Further investigation should be undertaken in such instances.

If visual inspection of information present in the provider file is not sufficient to determine whether the computer-identified case is a false positive, then further investigation is necessary. Other information maintained by the carrier, including other computerized practice setting information and hardcopy (papers) files, should be consulted. Other sources that could provide valuable information include state agencies (e.g., for state license number). The provider should also be contacted by phone and/or mail.

Data Elements

To detect cases of multiple UPINs for a provider, a "screener" variable (SCREENER) is created that is the result of concatenating parts of two data elements together to form one new variable. SCREENER uses the date of birth and the first three letters of the last name of the provider. Date of birth is included in SCREENER because of the large number of individuals with common last names such as Jones and Smith. Because of the inordinate number of providers with a date of birth of January 1, 1901, we believe that its usage is not valid. Additionally, although technically feasible, dates of birth prior to 1901 also seem implausible. Therefore, only *feasible* dates of birth after January 1, 1901 are used in the algorithm to detect multiple UPIN cases. Because of concern about spelling variation (mistakes), only the first three letters of the last name are used (spaces, numbers, and special characters are not considered letters).

The total number of potential multiple-UPIN cases, for which only one carrier was identified, was 2,192 cases when using the above algorithm (Chapter 8 in our *Carrier Analysis*). Only six carriers would have to investigate more than 100 computer-identified cases (215 is the most) and another six carriers would have between 50 and 100 cases. The other carriers would have less than 50 cases each to investigate.

Provider Records Without Feasible Dates of Birth

For providers without feasible dates of birth (or prior to January 2, 1901), just use the first three letters of the provider's last name as the value of SCREENER and modify the detection algorithm as necessary. We have not tested this algorithm on the Registry file and therefore cannot provide estimates of the investigation burden.

LOGIC TO DETECT MULTIPLE-UPIN PROVIDERS

Exclude from the detection run: (1) providers with no active practice settings, and (2) dates of birth prior to January 2, 1901 and all infeasible dates.

Create a SCREENER variable by concatenating the date of birth and the first three letters of the provider's last name (use only letters).

Sort the file by SCREENER.

If there is only one provider (observation) for a given value of SCREENER, then drop the observation from subsequent processing. The remaining observations constitute the pool of *potential* cases of multiple-UPIN providers. (Dividing the total number of remaining observations by two will provide an approximate number of potential multiple-UPIN cases.)

For each value of SCREENER, print information for each provider that could be useful for distinguishing individual providers from one another. We recommend, at a minimum, the following data elements to help determine whether the detected case should be further investigated as a potential multiple-UPIN provider:

- date of birth
- provider's last name
- provider's first name
- provider's middle initial
- provider's name suffix (e.g., Jr.)
- provider credentials
- physician status
- state licensed in
- state license number
- school code
- graduation year

```
  /*********************************************************/
  /*                                                       */
  /* -CHECK FOR MULTIPLE UPINS PER PHYSICIAN FOR ACTIVE    */
  /*  PRACTICE SETTINGS.                                   */
  /*                                                       */
  /*********************************************************/

DATA X; SET IN.JUL0293
        (WHERE=(DOB>0)
         DROP=CONTROL OLJLNAME--OLDSUFF NUMCARRY AUDITIND--OLDCNTRL
              NUMMEDIC--SETSTAT BOARD1--BOARD2 PRACTIND--LINK
              STATVAL--AMAIND);

IF (INTERN='R' ] INTERN='I' ] INTERN='P') THEN DRIP='A';
 ELSE IF INTERN='D' THEN DRIP='D';
 ELSE DRIP='M';

  /*****************************************************************/
  /*                                                               */
  /*   The next statement drops de-activated settings              */
  /*   from subsequent processing                                  */
  /*                                                               */
  /*****************************************************************/

IF DRIP IN ('A','M');

IF SETDATE>0 THEN SETYR = SUBSTR(SETDATE,7,2);

IF SETYR='89' THEN SETYRADD=1;
ELSE IF SETYR='90' ] SETYR='91' THEN SETYRADD=2;
ELSE IF SETYR='92' ] SETYR='93' THEN SETYRADD=3;
ELSE DELETE;

PROC SORT; BY UPIN SETDATE;
RUN;

DATA A; SET X; BY UPIN;
        IF FIRST.UPIN;

  /*********************************************************************/
  /*                                                                   */
  /*   This section checks the validity of date of birth.  Non-feasible */
  /*   dates of birth & dates=Jan. 1, 1901 are not included            */
  /*                                                                   */
  /*********************************************************************/

  DOBYR = SUBSTR(DOB,7,2);
  DOBMO = SUBSTR(DOB,9,2);
  MODAY = SUBSTR(DOB,9,4);
  IF DOBYR='  ' THEN DO;
   IF (101<=DOB<=131) ] (201<=DOB<=229) ]
      (301<=DOB<=331) ] (401<=DOB<=430) ]
      (501<=DOB<=531) ] (601<=DOB<=630) ]
      (701<=DOB<=731) ] (801<=DOB<=831) ]
      (901<=DOB<=930) ] (1001<=DOB<=1031) ]
      (1101<=DOB<=1130) ] (1201<=DOB<=1231)
```

```
      THEN DOBYR='00';
   END;

IF DOBYR='00' THEN BYRH=0;
ELSE IF ' 1'<=DOBYR<'20' THEN BYRH=1;
ELSE IF '20'<=DOBYR<='69' THEN BYRH=2;
ELSE IF '70'<=DOBYR<='98' THEN BYRH=3;
ELSE IF DOBYR='99' & ('  '<DOBMO<'13') THEN BYRH=4;
ELSE IF DOBYR='99' THEN BYRH=5;
ELSE IF DOB=0 THEN BYRH=6;

IF BYRH=. ] BYRH=5 ] BYRH=6 THEN BYRHX=1;
ELSE IF BYRH=3 THEN BYRHX=2;
ELSE IF BYRH=4 THEN BYRHX=3;
ELSE BYRHX=4;

IF BYRHX=4 & MODAY^='0000' & DOB^=10101 &
    ((' 101'<=MODAY<='0131') ] (' 201'<=MODAY<='0229') ]
     (' 301'<=MODAY<='0331') ] (' 401'<=MODAY<='0430') ]
     (' 501'<=MODAY<='0531') ] (' 601'<=MODAY<='0630') ]
     (' 701'<=MODAY<='0731') ] (' 801'<=MODAY<='0831') ]
     (' 901'<=MODAY<='0930') ] ('1001'<=MODAY<='1031') ]
     ('1101'<=MODAY<='1130') ] ('1201'<=MODAY<='1231'));

INFORMAT F1 $1. L1-L20 $1. L1_3 $3. LN1-LN20 2.;

L1 = SUBSTR(LNAME,1,1);
L2 = SUBSTR(LNAME,2,1);
L3 = SUBSTR(LNAME,3,1);
L4 = SUBSTR(LNAME,4,1);
L5 = SUBSTR(LNAME,5,1);
L6 = SUBSTR(LNAME,6,1);
L7 = SUBSTR(LNAME,7,1);
L8 = SUBSTR(LNAME,8,1);
L9 = SUBSTR(LNAME,9,1);
L10 = SUBSTR(LNAME,10,1);
L11 = SUBSTR(LNAME,11,1);
L12 = SUBSTR(LNAME,12,1);
L13 = SUBSTR(LNAME,13,1);
L14 = SUBSTR(LNAME,14,1);
L15 = SUBSTR(LNAME,15,1);
L16 = SUBSTR(LNAME,16,1);
L17 = SUBSTR(LNAME,17,1);
L18 = SUBSTR(LNAME,18,1);
L19 = SUBSTR(LNAME,19,1);
L20 = SUBSTR(LNAME,20,1);

  /*****************************************************************/
  /*                                                               */
  /*   The first 3 letters of the last name are used as part of the */
  /*   SCREENER.  Spaces and other special characters are not      */
  /*   included.  The first 5 letters of the last name were checked */
  /*   as part of the construction of L1_3.                        */
  /*                                                               */
  /*****************************************************************/
```

```
IF ('A'<=L1<='Z') & ('A'<=L2<='Z') & ('A'<=L3<='Z') THEN
    L1_3 = L1]]L2]]L3;
ELSE IF ('A'<=L1<='Z') & ('A'<=L2<='Z') & ('A'<=L4<='Z') THEN
    L1_3 = L1]]L2]]L4;
ELSE IF ('A'<=L1<='Z') & ('A'<=L2<='Z') & ('A'<=L5<='Z') THEN
    L1_3 = L1]]L2]]L5;
ELSE IF ('A'<=L1<='Z') & ('A'<=L3<='Z') & ('A'<=L4<='Z') THEN
    L1_3 = L1]]L3]]L4;
ELSE IF ('A'<=L1<='Z') & ('A'<=L4<='Z') & ('A'<=L5<='Z') THEN
    L1_3 = L1]]L4]]L5;
ELSE IF ('A'<=L2<='Z') & ('A'<=L3<='Z') & ('A'<=L4<='Z') THEN
    L1_3 = L2]]L3]]L4;
ELSE IF ('A'<=L2<='Z') & ('A'<=L3<='Z') & ('A'<=L5<='Z') THEN
    L1_3 = L2]]L3]]L5;
ELSE IF ('A'<=L3<='Z') & ('A'<=L4<='Z') & ('A'<=L5<='Z') THEN
    L1_3 = L3]]L4]]L5;
ELSE L1_3 = L1]]L2]]L3;

SCREENER = DOB]]L1_3;

RUN;
PROC SORT; BY SCREENER;
   RUN;

  /*****************************************************************/
  /*                                                               */
  /*   The IF statement that follows drops single UPIN providers   */
  /*   from subsequent processing                                  */
  /*                                                               */
  /*****************************************************************/

DATA C; SET A(DROP=L1-L20 LN1-LN20 L1_3 MODAY DOBMO
                   DOBYR SETYR BYRH BYRHX);
        BY SCREENER;

 IF FIRST.SCREENER & LAST.SCREENER THEN DELETE;

RUN
```

APPENDIX A

MEDICAL SCHOOL ESTABLISHMENT AND CLOSURE DATES

APPENDIX A

MEDICAL SCHOOL ESTABLISHMENT AND CLOSURE DATES

HCFA ID	MEDICAL SCHOOL	LOCATION	YEAR OPEN	YEAR CLOSE
00102	University of Alabama School of Medicine	Birmingham, AL	1859	3000
00104	Birmingham Medical College	Birmingham, AL	1894	1915
00106	University of South Alabama College of Medicine	Mobile, AL	1967	3000
00301	University of Arizona College of Medicine	Tuscon, AR	1962	3000
00401	University of Arkansas College of Medicine	Little Rock, AR	1879	3000
00402	College of Physicians and Surgeons	Little Rock, AR	1906	1911
00501	Cooper Medical College	San Francisco, CA	1882	1912
00502	University of California, San Francisco, School of Medicine	San Francisco, CA	1864	3000
00504	California Eclectic Medical College	Los Angeles, CA	1907	1915
00505	Hahneman Medical College of the Pacific (Homeopathic)	San Francisco, CA	1902	1918
00506	University of Southern California School of Medicine	Los Angeles, CA	1885	3000
00507	College of Physicians and Surgeons of San Francisco	San Francisco, CA	1896	1921
00508	Oakland College of Medicine and Surgery	Oakland, CA	1900	1920
00509	College of Physicians and Surgeons of Los Angeles	Los Angeles, CA	1904	1909
00511	Stanford University School of Medicine	Palo Alto, CA	1908	3000
00512	Loma Linda University School of Medicine	Loma Linda, CA	1909	3000
00513	Pacific Medical College	Los Angeles, CA	1913	1916
00514	University of California, Los Angeles, School of Medicine	Los Angeles, CA	1951	3000
00515	University of California, Irvine, California College of Medicine	Irvine, CA	1962	3000
00516	University California Ca College of Med Irvine CA	Irvine, CA	1962	3000
00517	University Of Cal College of Medicine Irvine CA	Irvine, CA	1962	3000
00518	University of California, San Diego, School of Medicine	La Jolla, CA	1962	3000
00519	University of California, Davis, School of Medicine	Davis, CA	1963	3000
00702	University of Colorado School of Medicine	Denver, CO	1883	3000
00705	Denver and Gross College of Medicine	Denver, CO	1902	1911
00801	Yale University School of Medicine	New Haven, CT	1810	3000
00802	University of Connecticut School of Medicine	Farmington, CT	1961	3000
01001	George Washington University School of Medicine and Health Sciences	Washington, D.C	1825	3000
01002	Georgetown University School of Medicine	Washington, D.C.	1851	3000
01003	Howard University College of Medicine	Washington, D.C.	1868	3000
01102	University of Miami School of Medicine	Miami, FL	1952	3000
01103	University of Florida College of Medicine	Gainesville, FL	1956	3000
01104	University of South Florida College of Medicine	Tampa, FL	1965	3000
01201	Medical College of Georgia	Augusta, GA	1828	3000
01205	Emory University School of Medicine	Augusta, GA	1854	3000
01209	Georgia College of Eclectic Medicine and Surgery	Augusta, GA	1886	1916
01211	Atlanta College of Physicians and Surgeons	Atlanta, GA	1898	1913
01212	Atlanta School of Medicine	Atlanta, GA	1905	1913
01218	Hospital Medical College Eclectic	Atlanta, GA	1908	1911
01219	Southern College of Medicine & Surgery	Atlanta, GA	1911	1914
01221	Morehouse School of Medicine	Atlanta, GA	1978	3000
01222	Mercer University School of Medicine	Macon, GA	1973	3000
01401	University of Hawaii John A. Burns School of Medicine	Honolulu, HI	1967	3000
01601	Rush Medical College	Chicago, IL	1837	3000
01602	University of Chicago Pritzker School of Medicine	Chicago, IL	1924	3000
01604	Hahneman Medical College and Hospital	Chicago, IL	1855	1922
01605	College Of Medicine and Surgery (Physio-Medical)	Chicago, IL	1899	1911

APPENDIX A (continued)

MEDICAL SCHOOL ESTABLISHMENT AND CLOSURE DATES

HCFA ID	MEDICAL SCHOOL	LOCATION	YEAR OPEN	YEAR CLOSE
01606	Northwestern University Medical School	Chicago, IL	1859	3000
01608	Bennett Medical College	Chicago, IL	1909	1915
01609	Northwestern University Womans Medical School	Chicago, IL	1892	1902
01610	The Chicago Homeopathic Medical College	Chicago, IL	1877	1904
01611	University of Illinois College of Medicine	Chicago, IL	1881	3000
01613	Harvey Medical College	Chicago, IL	1891	1905
01814	National Medical University	Chicago, IL	1891	1914
01615	Hering Medical College (Homeopathic)	Chicago, IL	1892	1913
01616	Jenner Medical College	Chicago, IL	1896	1917
01617	Illinois Medical College	Chicago, IL	1894	1910
01618	Dunham Medical College	Chicago, IL	1896	1902
01619	American Medical Missionary College	Battle Creek, Mi & Chicago, IL	1895	1910
01622	Chicago College of Medicine and Surgery	Chicago, IL	1907	1917
01623	Dearborn Medical College	Chicago, IL	1903	1907
01642	University of Health Sciences/The Chicago Medical School	North Chicago, IL	1912	3000
01643	Loyola University of Chicago, Stritch School of Medicine	Maywood, IL	1915	3000
01644	The General Medical College	Chicago, IL	1922	1924
01645	Southern Illinois University School of Medicine	Springfield, IL	1969	3000
01705	Physio-Medical College of Indiana	Indianapolis, IN	1873	1909
01708	The Medical College of Indiana	Indianapolis, IN	1878	1905
01709	Central College of Physicians & Surgeons	Indianapolis, IN	1879	1905
01717	Eclectic Medical College of Indiana	Indianapolis, IN	1900	1908
01718	Indiana Medical College, School of Medicine of Purdue University	Indianapolis, IN	1905	1908
01720	Indiana University School of Medicine	Indianapolis, IN	1903	3000
01801	College of Physicians and Surgeons	Keokuk, IA	1849	1899
01803	University of Iowa College of Medicine	Iowa City, IA	1850	3000
01804	State University of Iowa, College of Homeopathic Medicine	Iowa City, IA	1877	1919
01806	Drake University College of Medicine	Des Moines, IA	1903	1913
01808	Sioux City College of Medicine	Sioux City, IA	1891	1909
01810	Keokuk Medical College, College of Physicians and Surgeons	Keokuk, IA	1899	1908
01902	University of Kansas School of Medicine	Kansas City, KS	1899	3000
01903	Kansas Medical College (Medical Department of Washburn College)	Topeka, KS	1890	1913
01904	College of Physicians and Surgeons of Kansas City	Kansas City, KS	1894	1905
01907	Western Eclectic College of Medicine and Surgery	Kansas City, KS	1908	1909
02001	Kentucky School of Medicine	Louisville, KY	1850	1908
02002	University Of Louisville School of Medicine	Louisville, KY	1833	3000
02004	Louisville Medical College	Louisville, KY	1869	1907
02005	Hospital College of Medicine (Med Dept of Central University)	Louisville, KY	1873	1907
02007	Louisville National Medical College (Med Dept State University)(Black)	Louisville, KY	1888	1912
02008	Southwestern Homeopathic Medical College and Hospital	Louisville, KY	1893	1910
02009	Kentucky University Medical Department	Louisville, KY	1898	1907
02011	Louisville and Hospital Medical College	Louisville, KY	1907	1908
02012	University of Kentucky College of Medicine	Lexington, KY	1954	3000
02101	Tulane University School of Medicine	New Orleans, LA	1834	3000
02104	Flint Medical College of New Orleans University (Black)	New Orleans, LA	1901	1911
02105	Louisiana State University School of Medicine in New Orleans	New Orleans, LA	1931	3000
02106	Louisiana State University School of Medicine in Shreveport	Shreveport, LA	1966	3000

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APPENDIX A (continued)

MEDICAL SCHOOL ESTABLISHMENT AND CLOSURE DATES

HCFA ID	MEDICAL SCHOOL	LOCATION	YEAR OPEN	YEAR CLOSE
02201	Bowdoin Medical School	Brunswick and Portland, ME	1915	1921
02301	University of Maryland School of Medicine	Baltimore, MD	1807	3000
02303	College of Physicians and Surgeons of Baltimore	Baltimore, MD	1872	1915
02304	Baltimore Medical College	Baltimore, MD	1881	1913
02305	Woman's Medical College of Baltimore	Baltimore, MD	1882	1910
02306	Baltimore University School of Medicine	Baltimore, MD	1884	1907
02307	John Hopkins University School of Medicine	Baltimore, MD	1893	3000
02308	Atlantic Medical College	Baltimore, MD	1907	1910
02309	Maryland Medical College	Baltimore, MD	1898	1913
02311	Maryland College of Eclectic Medicine and Surgery	Baltimore, MD	1914	1915
02312	Uniformed Services University of Health Science	Bethesda, MD	1972	3000
02401	Harvard Medical School	Boston, MA	1782	3000
02405	Boston University School of Medicine	Boston, MA	1873	3000
02406	College of Physicians and Surgeons	Boston, MA	1880	1949
02407	Tufts University School of Medicine	Boston, MA	1893	3000
02415	Middlesex University School of Medicine	Waltham, MA	1937	1946
02416	University of Massachusetts Medical School	Worcester, MA	1962	3000
02501	University of Michigan Medical School	Ann Arbor, MI	1850	3000
02505	University of Michigan Homeopathic Medical School	Ann Arbor, MI	1875	1922
02507	Wayne State University School of Medicine	Detroit, MI	1868	3000
02508	Michigan College of Medicine & Surgery	Detroit, MI	1888	1907
02512	Michigan State University College of Human Medicine	East Lansing, MI	1964	3000
02604	University of Minnesota Medical School	Minneapolis, MN	1888	3000
02505	Minneapolis College of Physicians and Surgeons	Minneapolis, MN	1883	1908
02607	University of Minnesota Duluth School of Medicine	Duluth, MN	1969	3000
02608	Mayo Medical School	Rochester, MN	1971	3000
02701	University Mississippi School of Medicine	Jackson, MI	1903	3000
02702	Mississippi Medical College	Meridan, MI	1906	1912
02801	Missouri Medical College	St. Louis, MO	1840	1899
02802	Washington University Medical School	St. Louis, MO	1855	3000
02803	University of Missouri Columbia School of Medicine	Columbia, MO	1872	3000
02805	Homeopathic Medical College of Missouri	St. Louis, MO	1859	1909
02807	St. Louis College of Physicians and Surgeons	St. Louis, MO	1879	1917
02808	Kansas City Medical College	Kansas City, MO	1880	1905
02810	National University of the Arts and Sciences Medical Department	St. Louis, MO	1912	1918
02820	University Medical College of Kansas City	Kansas City, MO	1888	1913
02822	Ensworth Medical College	St. Joseph, MO	1888	1914
02826	Kansas City Homeopathic Medical College	Kansas City, MO	1888	1902
02828	Barnes Medical College	St. Louis, MO	1892	1911
02830	Woman's Medical College	Kansas City, MO	1895	1903
02833	Eclectic Medical University	Kansas City, MO	1898	1918
02834	Saint Louis University School of Medicine	St. Louis, MO	1901	3000
02835	Southwest School of Medicine and Hospital	Kansas City, MO	1915	1916
02843	Kansas City College of Medicine and Surgery	Kansas City, MO	1915	1926
02844	Kansas City University of Physicians and Surgeons	Kansas City, MO	1918	1944
02845	Mid West Medical College	Kansas City, MO	1933	1940
02846	University of Missouri Kansas City School of Medicine	Kansas City, MO	1969	3000

APPENDIX A (continued)

MEDICAL SCHOOL ESTABLISHMENT AND CLOSURE DATES

HCFA ID	MEDICAL SCHOOL	LOCATION	YEAR OPEN	YEAR CLOSE
03004	Lincoln Medical College, Eclectic	Lincoln, NE	1915	1918
03005	University of Nebraska College of Medicine	Omaha, NE	1880	3000
03006	Creighton University School of Medicine	Omaha, NE	1892	3000
03007	Nebraska College of Medicine	Lincoln, NE	1905	1909
03101	University of Nevada School of Medicine	Reno, NV	1969	3000
03201	Dartmouth Medical School	Hanover, NH	1797	3000
03305	University of Medicine and Dentistry of New Jersey-New Jersey Medical School	Newark, NJ	1956	3000
03306	University of Medicine and Dentistry of New Jersey- Robert Wood Johnson Medical School	Piscataway, NJ	1966	3000
03401	University of New Mexico School of Medicine	Albuquerque, NM	1961	3000
03501	Columbia University College of Physicians and Surgeons	New York, NY	1767	3000
03503	Albany Medical College of Union University	Albany, NY	1839	3000
03506	State University of New York at Buffalo School of Medicine	Buffalo, NY	1846	3000
03508	State University of New York Health Science Center at Brooklyn	Brooklyn, NY	1860	3000
03509	New York Medical College	Valhalla, NY	1858	3000
03510	Bellevue Hospital Medical College	New York, NY	1861	1898
03511	New York Medical College and Hospital for Women, Homeopathic	New York, NY	1866	1918
03513	Eclectic Medical College of the City of New York	New York, NY	1866	1913
03515	State University of New York Health Science Center	Syracuse, NY	1834	3000
03519	New York University School of Medicine	New York, NY	1841	3000
03520	Cornell University Medical College	New York, NY	1898	3000
03543	Fordham University School of Medicine	New York, NY	1907	1921
03545	University of Rochester School of Medicine and Dentistry	Rochester, NY	1920	3000
03546	Albert Einstein College of Medicine of Yeshiva University	New York, NY	1955	3000
03547	Mount Sinai School of Medicine of the City University of New York	New York, NY	1963	3000
03548	State University of New York at Stony Brook School of Medicine	Stony Brook, NY	1962	3000
03601	University of North Carolina at Chapel Hill School of Medicine	Chapel Hill, NC	1879	3000
03603	Leonard Medical School (Black)	Raleigh, NC	1882	1918
03604	North Carolina Medical College	Charlotte, NC	1907	1918
03605	Bowman Gray School of Medicine of Wake Forest University	Winston-Salem, NC	1902	3000
03607	Duke University School of Medicine	Durham, NC	1925	3000
03608	East Carolina University School of Medicine	Greenville, NC	1967	3000
03701	University of North Dakota School of Medicine	Grand Forks, ND	1905	3000
03801	Medical College of Ohio	Cincinnati, OH	1819	1909
03802	Eclectic Medical College	Cincinnati, OH	1910	1942
03803	Starling Medical College	Columbus, OH	1847	1907
03806	Case Western Reserve University School of Medicine	Cleveland, OH	1843	3000
03808	Cincinnati College of Medicine and Surgery	Cincinnati, OH	1849	1902
03809	Miami Medical College	Cincinnati, OH	1852	1909
03811	University of Wooster Medical Department	Cleveland, OH	1869	1881
03819	Toledo Medical College (Med Dept of Toledo University)	Toledo, OH	1883	1914
03823	Cleveland Medical College, Homeopathic	Cleveland, OH	1890	1898
03825	Ohio Medical University	Columbus, OH	1890	1907
03826	Cleveland-Pulte Medical College	Cleveland, OH	1910	1914
03840	Ohio State University College of Medicine	Columbus, OH	1907	3000
03841	University of Cincinnati College of Medicine	Cincinnati, OH	1819	3000
03843	Medical College of Ohio at Toledo	Toledo, OH	1964	3000
03844	Northeastern Ohio Universities College of Medicine	Rootstown, OH	1973	3000

APPENDIX A (continued)

MEDICAL SCHOOL ESTABLISHMENT AND CLOSURE DATES

HCFA ID	MEDICAL SCHOOL	LOCATION	YEAR OPEN	YEAR CLOSE
03845	Wright State University School of Medicine	Dayton, OH	1973	3000
03901	University of Oklahoma College of Medicine	Oklahoma City, OK	1900	3000
03905	Oral Roberts University School of Medicine	Tulsa, OK	1979	1990
04001	Willamette University Medical Department	Salem, OR	1866	1913
04002	Oregon Health Sciences University School of Medicine	Portland, OR	1887	3000
04101	University of Pennsylvania School of Medicine	Philadelphia, PA	1765	3000
04102	Jefferson Medical College of Thomas Jefferson University	Philadelphia, PA	1824	3000
04107	Medical College of Pennsylvania	Philadelphia, PA	1850	3000
04109	Hahnemann University School of Medicine	Philadelphia, PA	1848	3000
04111	Medico-Chirurgical College of Philadelphia	Philadelphia, PA	1881	1916
04112	University of Pittsburgh School of Medicine	Pittsburgh, PA	1886	3000
04113	Temple University School of Medicine	Philadelphia, PA	1901	3000
04114	Pennsylvania State University College of Medicine	Hershey, PA	1963	3000
04201	University of Puerto Rico School of Medicine	San Juan, Puerto Rico	1949	3000
04202	Ponce School of Medicine	Ponce, Puerto Rico	1978	3000
04203	University Central del Caribe Escuela de Medicina	Cayey, Puerto Rico	1976	3000
04204	Ciencias Medicina de San Juan Bautista	Hato Rey, Puerto Rico	1978	3000
04301	Brown University Program in Medicine	Providence, RI	1963	3000
04501	Medical University of South Carolina College of Medicine	Charleston, SC	1824	3000
04504	University of South Carolina School of Medicine	Columbia, SC	1974	3000
04601	University of South Dakota School of Medicine	Vermillion, SD	1907	3000
04701	University of Nashville Medical Department	Nashville, TN	1850	1911
04705	Vanderbilt University School of Medicine	Nashville, TN	1874	3000
04706	University of Tennessee College of Medicine	Memphis, TN	1851	3000
04707	Meharry Medical College School of Medicine	Nashville, TN	1876	3000
04708	Memphis Hospital Medical College	Memphis, TN	1878	1913
04709	Chattanooga Medical College	Chattanooga, TN	1889	1910
04710	Lincoln Memorial University Medical Department	Knoxville, TN	1909	1914
04711	University of the South Medical Department	Sewanee, TN	1892	1909
04713	Knoxville Medical College (Black)	Knoxville, TN	1900	1910
04714	University of West Tennesee College of Medicine and Surgery (Black)	Memphis, TN	1907	1923
04715	College of Physicians and Surgeons	Memphis, TN	1906	1911
04720	East Tennessee State University James H. Dishner College of Medicine	Johnson City, TN	1978	3000
04802	University of Texas Medical Branch at Galveston	Galveston, TX	1881	3000
04803	Fort Worth School Of Medicine	Fort Worth, TX	1894	1918
04804	Baylor University College Of Medicine	Houston, TX	1900	3000
04805	Physio-Medical College of Texas	Dallas, TX	1902	1908
04806	Southern Methodist University Medical Department	Dallas, TX	1911	1915
04807	Gate City Medical College	Dallas, TX	1910	1911
04812	University of Texas Southwestern Medical Center at Dallas School of Medicine	Dallas, TX	1943	3000
04813	University of Texas Medical School at San Antonio	San Antonio, TX	1966	3000
04814	University of Texas Medical School at Houston	Houston, TX	1969	3000
04815	Texas Tech University Health Sciences Center School of Medicine	Lubbock, TX	1969	3000
04816	Texas A&M University College of Medicine	College Station, TX	1971	3000
04901	University of Utah School of Medicine	Salt Lake City, UT	1905	3000
05002	University of Vermont College of Medicine	Burlington, VT	1822	3000
05101	University of Virginia School of Medicine	Charlottesville, VA	1825	3000

APPENDIX A (continued)

MEDICAL SCHOOL ESTABLISHMENT AND CLOSURE DATES

HCFA ID	MEDICAL SCHOOL	LOCATION	YEAR OPEN	YEAR CLOSE
05104	Virginia Commonwealth University Medical College of Virginia	Richmond, VA	1838	3000
05106	University College of Medicine	Richmond, VA	1893	1913
05107	Eastern Virginia Medical School	Norfolk, VA	1973	3000
05404	University of Washington School of Medicine	Seattle, WA	1945	3000
05415	Washington College of Physicians and Surgeons	Seattle, WA		
05501	West Virginia University School of Medicine	Morgantown, WV	1902	3000
05502	Marshall University School of Medicine	Huntington, WV	1974	3000
05602	Wisconsin College of Physicians and Surgeons	Milwaukee, WI	1893	1912
05603	Milwaukee Medical College	Milwaukee, WI	1894	1912
05605	University of Wisconsin Medical School	Madison, WI	1907	3000
05606	Medical College of Wisconsin	Milwaukee, WI	1912	3000

Notes:

1. It appears that three codes have been assigned to the medical school at the University of California at Irvine (see shaded lines on first page of this table).
2. A value of 3000 in the year closed column indicates that the school is still open.
3. Open and close dates could not be found for the Washington College of Physicians and Surgeons (05415).

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